NUREG-0797
Supplement No. 13

Safety Evaluation Report

related to the operation of
Comanche Peak Steam Electric Station,
Units 1 and 2

Docket Nos. 50-445 and 50-446

Texas Utilities Electric Company, et al.

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

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ABSTRACT

Supplement 13 to the Safety Evaluation Report related to the operation of Comanche Peak Steam Electric Station (CPSES), Units 1 and 2 (NUREG-0797), has been prepared by the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission (NRC). The facility is located in Somervell County, Texas, approximately 40 miles southwest of Fort Worth, Texas. This supplement presents the staff's evaluation of the Comanche Peak Response Team (CPRT) Program Plan which was formulated by the applicant to resolve various construction and design issues raised by the Atomic Safety and Licensing Board, allegers, intervenor Citizens Association for Sound Energy (CASE), NRC inspections of various types, and Cygna Energy Services while conducting its independent design assessment.

The NRC staff concludes that the CPRT Program Plan provides an overall structure for addressing all existing issues and any future issues which may be identified from further evaluations, and if properly implemented will provide important evidence of the design and construction quality of CPSES, and will identify any needed corrective action. The report identifies items to be addressed by the NRC staff during the implementation phase.

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PRINCIPAL CONTRIBUTORS

NRC STAFF

Name	Organization: Branch (Division)/Office*
I. Barnes	Region IV
J. Calvo	Plant Electrical, Instrumentation & Control Systems (PWR-B)/NRR
C. Early	Project Directorate #5 (PWR-A)/NRR
L. Ellershaw	Region IV
J. Gilray	Quality Assurance/IE
B. Grimes	Quality Assurance, Vendor, & Technical Training Center Programs/IE
C. Hale	Region IV
S. Hou	Engineering (PWR-A)/NRR
D. Jeng	Engineering (PWR-A)/NRR
J. Knox	Electrical, Instrumentation & Control Systems (BWR)/NRR
D. Lurie	Management Support/RM
E. Marinos	Integrated Safety Assessment Directorate (PWR-B)/ NRR
J. Milhoan	Plant Systems (PWR-A)/NRR
V. Noonan	Project Directorate #5 (PWR-A)/NRR
D. Norkin	Quality Assurance/IE
L. Shao	Engineering Technology/RES
W. Smith	Resident Inspector, Region IV
J. Spraul	Quality Assurance/IE
D. Terao	Engineering (PWR-B)/NRR
E. Tomlinson	Plant, Electrical, Instrumentation & Control Systems (PWR-B)/NRR
C. Trammell	Project Directorate #5 (PWR-A)/NRR
A. Vietti-Cook	Project Directorate #5 (PWR-A)/NRR
P. Wagner	Region IV
T. Westerman	Region IV

*NRR = Office of Nuclear Reactor Regulation; IE = Office of Inspection and Enforcement; RM = Office of Resource Management; RES = Office of Nuclear Regulatory Research.

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CONSULTANTS

Battelle, Columbus Division

B. Saffell

Brookhaven National Laboratory

P. Bezler
C. Hofmayer

Comex Corporation

C. Haughney

EG&G

M. Yost

Energy Technology Engineering Center

P. Chen
E. Thompson

Engineering Analysis Services, Inc.

V. Ferrarini
R. Masterson

Teledyne Engineering Services

R. Ciatto
J. Cragin
J. Flaherty
R. Hookway
D. Landers
J. Rivard
E. Solla

WESTEC Services, Inc.

J. Nevshemal

ZYTOR, Inc.

L. Stanley

Independent

P. Keshishian
R. Philleo
N. Rivera

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ABBREVIATIONS

A/E	architect/engineer
AFW	auxiliary feedwater system
ANSI	American National Standards Institute
ASLB	Atomic Safety and Licensing Board
ASME	American Society of Mechanical Engineeers
BOP	balance of plant
CAP	Construction Adequacy Program
CAT	Construction Appraisal Team
CFR	Code of Federal Regulations
CILRT	containment integrated leak rate test
CPRT	Comanche Peak Response Team
CPSES	Comanche Peak Steam Electric Station
CVCS	chemical and volume control system
DAP	Design Adequacy Program
DSAP	Discipline-Specific Action Plan
ERC	Evaluation Research Corporation
ESI	external source issue
FSAR	Final Safety Analysis Report
HDA	homogenous design activity
HFT	hot functional testing
I&C	instrumentation and control
IAP	Independent Assessment Program
IE	NRC Office of Inspection and Enforcement
ISAP	Issue-Specific Action Plan
JTG	Joint Test Group
NCR	nonconformance report
NRC	U.S. Nuclear Regulatory Commission
NSSS	nuclear steam supply system
OQT	Overview Quality Team
QA	quality assurance

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QC	quality control
QOC	Quality of Construction and QA/QC Adequacy Program
RCS	reactor coolant system
RHR	residual heat removal
RIV	Region IV
RTL	Review Team Leader
SIT	Special Investigation Team
SRT	Senior Review Team
SSER	Supplemental Safety Evaluation Report
SWEC	Stone & Webster Engineering Corporation
TERA	TERA Corporation
TRT	Technical Review Team
TUEC	Texas Utilities Electric Company
TUGCO	Texas Utilities Generating Company
WA	work activity

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1.0 INTRODUCTION

1.1 Background

On March 12, 1984, the U.S. Nuclear Regulatory Commission's (NRC's) Executive Director for Operations established a program to ensure that technical concerns and allegations related to Comanche Peak Steam Electric Station (CPSES) design and construction activities would be addressed in a coordinated and integrated manner by the NRC staff. As a means of executing its assigned responsibilities, the NRC formed a Technical Review Team (TRT) representing the following disciplines:

- o electrical/instrumentation
- o civil/structural
- o mechanical/piping
- o quality assurance/quality control (QA/QC)
- o protective coatings
- o testing programs
- o miscellaneous

The TRT initiated a series of onsite inspections and evaluations in July 1984, and documented the results of these activities in five supplements to the Comanche Peak Safety Evaluation Report (NUREG-0797, "Safety Evaluation Report Related to the Operation of the CPSES, Units 1 and 2," Supplements 7-11). Before these Supplemental Safety Evaluation Reports (SSERs) were published, the staff issued letters on September 18, 1984; November 29, 1984; and January 8, 1985, summarizing the principal issues that had to be resolved.

In response to the concerns and issues identified by the TRT, Texas Utilities Electric Company (TUEC) formed the Comanche Peak Response Team (CPRT) for the purpose of addressing identified concerns. TUEC initially submitted its CPRT Program Plan on October 8, 1984, and issued Revision 1 on November 21, 1984, in response to comments on the initial version that were received from the NRC staff during meetings on October 19 and 23, 1984.

The initial version and Revision 1 of the Program Plan were written before the publication of SSERs 7 through 11, which collectively provided more than 1,100 pages of the staff's evaluation of the several hundred allegations of design and construction inadequacies. Following publication of the detailed staff evaluations contained in these SSERs and with the recognition of the need to resolve outstanding issues raised by groups other than the TRT, TUEC submitted Revision 2 to the CPRT Program Plan on June 28, 1985. Revision 2 greatly expanded on the earlier revision and provided an extensive corrective action program to be undertaken by TUEC to resolve outstanding issues from a variety of sources.

In letters dated August 9 and September 30, 1985, the staff provided comments on Revision 2 to the CPRT Program Plan. TUEC specifically addressed these staff comments in a letter dated November 22, 1985, and followed with Revision 3 to the CPRT Program Plan, dated January 27, 1986. Revision 3 has

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been supplemented by submissions in letters from TUEC on January 31 and February 7, and by two letters on February 28, 1986. With these submissions and the anticipated receipt of one additional item involving hot functional testing, TUEC has completed its description of its planned corrective action program, the CPRT Program Plan. This Program Plan is intended to describe the program that will address all concerns and demonstrate an adequate level of quality of the design and construction of the CPSES. In addition, it will provide important evidence when implemented to ensure that the licensing criteria, requirements, and commitments presented in the Final Safety Analysis Report (FSAR) have been met.

1.2 Purpose, Scope, and Organization of SSER 13

1.2.1 Purpose and Scope

The NRC staff's review was based on the CPRT Program Plan, Revision 3, dated January 27, 1986, as supplemented on January 31, February 7, and February 28, 1986. The staff's understanding of the scope and organization of the CPRT Program Plan was aided by document reviews, audits and discussions at public meetings. Reference in SSER 13 to the "CPRT Program Plan" always assumes this third revision as supplemented. This SSER documents the staff's evaluation and conclusions regarding the CPRT Program Plan and supporting appendices, except for the final conclusion on the individual action plans contained in Appendix C of the Program Plan. These action plans are the subject of the staff's ongoing evaluation and inspection during the CPRT's implementation phase. As the CPRT produces reports describing the implementation of each action plan, the staff will conclude its evaluation of these plans.

1.2.2 Organization

SSER 13 contains five sections and three appendices. Section 1.0, the Introduction, describes the background and purpose of the CPRT, introduces key terms associated with the CPRT, and describes the CPRT process for identifying and evaluating issues and for ensuring proper corrective action. Section 2.0 describes the staff's evaluation of the CPRT's Quality of Construction and QA/QC Adequacy Program; Section 3.0 describes the staff's evaluation of the Design Adequacy Program; Section 4.0 contains the staff's evaluation of the CPRT's quality assurance program; and Section 5.0 describes the staff's conclusions regarding the CPRT program. Appendix A is a complete listing of the individual sections of the CPRT Program Plan that have been reviewed by the staff. This listing includes the appropriate revision for each section. Appendices B and C contain those items the staff has asked TUEC to address during the implementation phase of the CPRT.

Unlike the programs for resolving design and construction issues, the CPRT Program Plan does not contain a separate plan that envelops the existing individual testing action plans that will demonstrate the adequacy of testing conducted at CPSES. For this reason, the staff has not included a separate section in this SSER describing its evaluation of the CPRT's testing program. The staff's evaluation of existing testing issues is ongoing (except for the hot functional testing issue for which a plan has not yet been made available for staff review) and will continue during the CPRT implementation phase. The staff will conclude its evaluation of these testing issues when the CPRT has finished its assessment and has documented its results, and will then determine whether a conclusion can be reached based on these results about the adequacy of the CPSES testing program.

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1.3 CPRT Terminology

The CPRT effort has its own nomenclature, some of which is introduced here to help the reader.

The CPRT Program Plan essentially consists of two parts--one part relates to CPSES design adequacy and the other part relates to construction adequacy. The first two terms describe these parts.

Design Adequacy Program (DAP). The DAP is the portion of the CPRT Program Plan that resolves issues pertaining to design adequacy.

Quality of Construction and Quality Assurance/Quality Control (QA/QC) Adequacy Program (QOC). This program is the portion of the CPRT Program Plan that resolves issues related to the adequacy of the CPSES construction QA/QC program and the adequacy of installed hardware. The CPRT Program Plan uses the abbreviation QOC when referring to this program.

Collectively, the DAP, resolution of external source issues, and the QOC constitute the CPRT program. This combined program resolves issues from the two types of sources:

External Source Issues. These issues arose from sources external to TUEC. These sources include: (1) the TRT, (2) the Atomic Safety and Licensing Board (ASLB) proceeding on the CPSES operating license, (3) the NRC staff's Supplemental Safety Evaluation Reports (SSERs), (4) the staff's Construction Appraisal Team (CAT) and Special Investigation Team (SIT) reports, (5) applicable inspection reports issued by the NRC's Region IV (RIV) office, (6) the Cygna Energy Services Independent Assessment Program (IAP), and (7) intervenors.

Self-Initiated Evaluation. The CPRT is conducting a self-initiated evaluation of the CPSES quality of construction and adequacy of design. For construction, this effort involves a sample reinspection of hardware or documentation review that is intended to be representative of all the safety-related work performed by all vendors and other organizations' activities conducted during the construction of CPSES. In the design area, the effort involves the selection for review of designs that are intended to be representative of all the architect/engineer (A/E) safety-related design scope relative to design criteria, disciplines, processes, and organizations used in the design of the plant.

The CPRT Program Plan contains two types of action plans to resolve individual issues in the construction and design areas. These action plans are:

Issue-Specific Action Plans (ISAPs). The ISAPs address specific CPSES construction and QA/QC issues and some design-related issues regarding either hardware or aspects of the QA/QC program that have been identified by external sources. ISAPs are resolved individually; their collective significance is evaluated within the QOC program. An additional ISAP implements the CPRT's self-initiated portion of the QOC. For a more complete description of the general contents of the ISAPs, see pages 5 through 12 of Appendix B to the CPRT Program Plan. For a list of the ISAPs, see Appendix A of this SSER.

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Discipline-Specific Action Plans (DSAPs). The DSAPs address specific CPSES design issues regarding the adequacy of either the design or the design process which have been identified by external sources or by the CPRT as a result of other evaluations. Certain DSAP tasks also implement the CPRT's self-initiated design evaluations. Those DSAPs encompassing piping and pipe supports and cable tray and conduit supports entail a significant level of engineering reanalysis, and are being performed for the CPSES project by engineering organizations that were not responsible for the original design. The CPRT will perform a third-party review of the analytical process and the design criteria for these major reanalysis efforts. For a list of the DSAPs, see Appendix A of this SSER.

The descriptions of ISAPs and DSAPs (above) imply that all construction issues are addressed in ISAPs and that all design issues are addressed in DSAPs. In reality, that simple differentiation does not always apply, for some of the ISAPs address issues that involve both construction and design matters. In any event, design-related technical or programmatic conclusions developed in these ISAPs are included in related DSAPs for root-cause determinations and generic-implications evaluations.

1.4 Purpose of the CPRT

As described on pages 2 through 6 of the CPRT Program Plan, the CPRT is charged with resolving issues so that it can advise TUEC management whether there is reasonable assurance that the CPSES has been so designed, constructed, and tested that it can be operated safely. To accomplish this goal, the CPRT has committed itself to three objectives:

(1) Evaluate Each External Source Issue

The CPRT will evaluate each external source issue relating to design adequacy, quality of construction, and testing. Then the CPRT will determine the nature of any safety-significant deficiencies and will identify the necessary corrective action. Accomplishment of this objective by the CPRT is intended to provide TUEC with reasonable assurance that there are no undetected and uncorrected safety-significant deficiencies associated with any of the external source issues.

(2) Determine Root Causes, Adverse Trends, and Generic Implications

The CPRT will investigate and attempt to determine the root cause of each safety-significant deficiency and any adverse trends indicated by (a) deviations that are not safety significant or by (b) design observations. The CPRT will analyze the generic implications of each root cause that is found in order to determine the extent of any additional construction, design, or testing activities that might be deficient for the same reasons. These terms are defined in Section 1.5 below. Accomplishment of this objective by the CPRT is intended to provide TUEC with a resolution of each external source issue and to bound the safety-significant implications of identified deficiencies.

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(3) Conduct a Self-Initiated Evaluation

Although the external source issues are numerous, they are not inclusive of all aspects of design and construction activities associated with the CPSES. The CPRT has committed to perform additional evaluations in certain areas in order to be able to improve confidence about CPSES design adequacy and construction quality. Accordingly, the CPRT developed as a third objective the conduct of a self-initiated evaluation of CPSES design adequacy and construction quality. In the design area, the self-initiated evaluation entails reviews of designs that are intended to be representative of the collective A/E safety-related design scope. This design evaluation will examine design criteria, disciplines, processes, and organizations used in design of safety-related aspects of the plant. In the construction area, the self-initiated evaluation consists of a sample reinspection of installed hardware or documentation review which is intended to be representative of the work activities performed during the safety-related construction of CPSES. Accomplishing this third objective by the CPRT is intended to provide TUEC management with further evidence about the adequacy of the design and construction of CPSES.

1.5 Problem Identification and Classification

There are four key aspects to the CPRT program: (1) identification, (2) classification, (3) evaluation, and (4) correction of problems. In this section, the staff summarizes the methods chosen by the CPRT to classify identified discrepancies. For a detailed discussion of discrepancy classification, see pages 1 through 4 of Appendix E to the CPRT Program Plan.

In Appendix E, the CPRT has described five different sets of definitions to classify problems that are subject to evaluation by the CPRT. These five different sets apply to the DAP, the QOC, and ISAPs (including testing and QA/QC issues). The staff's understanding of these and other key terms, which have nearly universal applicability to all CPRT activities, are described below:

(1) Discrepancy. The term "discrepancy" is used to identify any problem eligible for consideration by the CPRT. This term encompasses the largest set of potential problems and carries no special meaning about the nature, importance, or potential safety impact of the potential problem.

(2) Design Observations. The term "observation" has meaning only for the DAP portion of the CPRT program. Each design discrepancy that is determined not to constitute a verified failure to meet a design commitment or specification will be classified as a design observation.

(3) Deviation. A deviation is a verified failure to meet a licensing commitment, to meet a regulatory requirement, or to properly install hardware. Not all discrepancies may turn out to be deviations, since not all identified problems turn out to be actual failures to meet a requirement, commitment, or installation specification.

(4) Deficiency. A deficiency is a deviation that has been evaluated as having safety significance, a term that is defined below.

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(5) Programmatic Deficiency. If a set of deviations or a set of design observations is evaluated as indicating an adverse trend, then a programmatic deficiency is said to exist.

(6) Safety Significant. Appendix E to the CPRT Program Plan defines "safety significant" to mean that the identified discrepancy, if uncorrected, would result in the loss of capability of the affected system, structure, or component to perform its intended safety function. For purposes of the CPRT program, credit is not allowed for redundancy at the component, system, train, or structure level.

The staff considers loss of margin to be important and considers it a matter that must be addressed during the safety-significant evaluations. The staff will confirm that this is being satisfactorily done as part of its review of the specific action plan results reports during the implementation phase of the program.

(7) Adverse Trend. A trend is a set of related deviations or design observations having attributes that reflect commonality. Examples of possible commonalities include:

- o the individual, group of individuals, or organization performing the activity
- o the program requirements, procedures, or controls governing the performance of the activity

A trend is considered to be adverse if it is determined that the identified pattern or commonality is likely to have resulted in the occurrence of an undetected deficiency in the affected area, population, or stratum. Adverse trends are also referred to as programmatic deficiencies.

Appendix E to the CPRT Program Plan describes the CPRT's method for classifying problems. The staff finds that the classification process, which is intended to track identified problems through an evaluation sequence from discrepancy through deviation to deficiency, is a logical process that should be suitable for satisfactory implementation by the CPRT and for independent inspection by the NRC staff.

Initially, the staff had expressed concern about the CPRT's ability to adequately identify items that were not in compliance with licensing commitments. Revision 3 to the Program Plan has satisfactorily resolved this concern indicating that

- o All deviations, which include items that fail to meet current licensing commitments, are tracked, evaluated, and classified according to safety significance.
- o Deviations are evaluated to determine if an adverse trend exists.
- o If TUEC should determine that an issue needs to be resolved by changing a licensing commitment, TUEC will submit an FSAR amendment requesting that the staff review and approve the change.

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1.6 CPRT Products: Evaluations, Corrective Action, and Reports

The CPRT will conduct or initiate four types of actions to resolve identified problems.

- o determination of root causes
- o evaluation of generic implications
- o initiation and review of corrective action
- o documentation of results

The first two of these actions constitute evaluations that the CPRT intends to use to resolve identified problems and to bound the extent of the associated deviations. The staff's understanding and evaluation of these actions are described below (see pages 2 and 7 through 9 of CPRT Program Plan for TUEC's discussion of these actions).

(1) Determination of Root Causes

The CPRT recognized that the specific items identified by external source issues may be representative of more fundamental, underlying concerns. Accordingly, the CPRT has committed to evaluate each issue, even if the issue is not safety significant.

The term "root cause" has not been defined by the CPRT. The staff understands a root cause to be the fundamental event or decision that was the most likely cause of the identified problem. Root causes will be investigated and determined where possible for all adverse trends indicated by deviations, design observations, and all deficiencies identified through the CPRT program. Such determinations will help the CPRT identify potential generic implications, establish appropriate expanded scopes of review, and define appropriate corrective actions.

ISAPs and DSAPs include tasks that will determine where possible the root causes of identified deficiencies and adverse trends. These tasks are oriented both at specific testing of any initial root-cause hypothesis and more general exploratory efforts that will lead to formulation and testing of new root-cause hypotheses as the action plan is implemented.

The staff has examined the CPRT's description of its intended methods for determining root causes and finds that the CPRT's description lacks sufficient detail to permit an independent evaluation of the methodology. At this stage in the CPRT process, few of the issues have been evaluated sufficiently to provide the CPRT with enough examples of deficiencies or adverse trends to implement a root-cause evaluation process. Nonetheless, the CPRT committed to evaluate root causes as the program progresses. The staff will verify that the CPRT has satisfactorily implemented this commitment as part of its review of the specific action plan results reports during the implementation phase of the program.

(2) Evaluation of Generic Implications

The term "generic implications" has not been defined by the CPRT. The staff considers generic implications to be the potential product of evaluations of root causes of deficiencies or adverse trends of deviations

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or design observations that demonstrate whether these problems represent isolated occurrences, generic weaknesses within a particular area, or generic weaknesses that are programmatic in nature. (See C.1, "General Comments," item 3, of Appendix C to this report for further staff comments on this subject.)

When the root causes of deficiencies or adverse trends have been determined, an evaluation will be performed to identify any associated potential generic implications. The CPRT maintains that such evaluations will enable it to determine whether the deficiencies or adverse trends represent isolated occurrences, generic weaknesses within a particular area, or generic weaknesses that are programmatic in nature.

The CPRT has stated that the results of these evaluations, in conjunction with assessments of the safety significance of the deviations, will enable it to define expanded scopes for review and to identify corrective actions both for the specific deficiency and for preventing repetition of the same types of deficiencies.

The staff has examined the CPRT's description of its intended methods for determining generic implications and finds that the CPRT's description lacks specificity to permit an independent evaluation of the methodology. At this stage in the implementation of the CPRT Program Plan, the root-cause determinations have not progressed sufficiently to permit meaningful determination of generic implications. However, the CPRT is committed to determine the generic implications of each root cause found as the program progresses. The staff will evaluate that the CPRT has satisfactorily implemented this commitment as part of its review of the specific action plan results reports during the implementation phase of the program.

(3) Initiation and Oversight of Corrective Action

The third action involves TUEC's methods for correcting identified problems and the CPRT's methods for overseeing and, in some cases, concurring in problem correction. Appendix H of the CPRT Program Plan contains TUEC's description of this corrective action process.

TUEC has structured its action to vest primary responsibility for implementing corrective action with CPSES project personnel rather than with the CPRT. Because of the special nature of this program, TUEC has committed that corrective actions by CPSES project personnel for all deficiencies and certain categories of deviations must be acceptable to the CPRT.

The CPRT is responsible for transmitting all deviations and deficiencies to CPSES project personnel for evaluation and disposition in accordance with project procedures for processing nonconformances.

For each deviation or deficiency identified by the CPRT, CPSES project personnel are responsible for performing reportability evaluations according to 10 CFR 50.55(e) criteria and for defining appropriate corrective actions. CPSES project personnel are also responsible for obtaining CPRT concurrence in the defined corrective actions for

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- each deficiency identified by the CPRT
- each programmatic deviation or programmatic deficiency identified by the CPRT
- each design deviation identified by the CPRT that involves a failure to meet FSAR criteria or commitments, other licensing commitments, or the regulations
- each deviation identified by the CPRT that has been determined by CPSES project personnel to meet the reportability criteria set forth in 10 CFR 50.55(e)

Should CPSES project personnel and the CPRT disagree about the adequacy of corrective action, TUEC has described a process for resolving such disputes (page 3 of Appendix H to the CPRT Program Plan). The staff finds this process for resolving disputes to be acceptable for the following reasons:

- The Program Plan describes a method for elevating disputes involving corrective action between a Review Team Leader and CPSES project personnel through successively higher levels of CPRT and CPSES project management.
- The ultimate responsibility for resolving these disputes rests with Texas Utilities Generating Company's (TUGCO's) senior nuclear officer, the Executive Vice President. By virtue of background, experience, and assigned responsibility, this official is responsible for nuclear safety involved in the design, construction, testing, and operation of CPSES. Appropriately, the Executive Vice President is TUGCO's final authority for resolving disputes involving the adequacy of corrective action, and this official bears the responsibility for the outcome of decisions that resolve these disputes.

The CPRT is responsible for performing confirmatory overviews to ensure that corrective actions have been effectively implemented for

- each programmatic deviation and programmatic deficiency
- each specific deficiency
- each specific design deviation that involves a failure to meet FSAR and licensing commitments
- each specific deviation that meets the reportability criteria of 10 CFR 50.55(e)

thus assuring that the CPSES Program Plan, insofar as corrective actions, is being fulfilled.

The CPRT will perform these overviews using design reviews, document reviews, and independent reinspection and witnessing inspections.

The staff has determined that TUEC's method for implementing corrective action and the CPRT's commitment to independently concur and overview key aspects of that corrective action are acceptable for the following three reasons:

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- o All deviations and deficiencies will be tracked, dispositioned, and closed in an auditable system, TUEC's nonconformance report (NCR) system. In addition, the CPRT's system for tracking deviations ensures that TUEC will generate an NCR for each deviation.

- o The prime responsibility for corrective action and records associated with those actions will reside with the organizational entity that will acquire operational control of the facility once an operating license is issued . The staff notes that it is important that the eventual facility operator controls, implements, and is responsible for this corrective action.

- o The CPRT will retain a sufficient level of concurrences and confirmatory overview of TUEC's corrective action for important deviations that the CPRT can ensure the adequacy of corrective action and can contribute to the credibility of this program.

(4) Documentation of Results

The CPRT has described several types of reports that will document the products of its activities. The principal types of reports that the CPRT will provide follow.

- o Results Reports

  Each ISAP and each DSAP will produce a results report. Each results report will, at a minimum, identify the deficiencies and programmatic deficiencies, their resolution, any root causes and generic implications and their resolution and any recommendations for programmatic improvements to decrease the chances for recurrence. The CPRT overview of corrective action implementation required by Appendix H (CPRT Program Plan) will either be included in the results report or in a supplement to the results report.

  The DAP will also produce third-party CPRT results reports concurring in the criteria, the processes used, and the implementation of the piping and pipe support and cable tray and conduit support design verification efforts.

- o Collective Evaluation Reports

  The results of the various activities (QOC, DAP, testing program adequacy, and individual ISAPs) will be collectively evaluated to ensure that potentially safety-significant trends implicit in the collective data but not apparent from the activity-specific results are not overlooked. These evaluations will be reported separately in collective evaluation reports.

  The collective evaluation report relating to the adequacy of the QA/QC program will include the identification of necessary improvements to future CPSES construction activities and to future plant operations. The collective evaluation report relating to the quality of installed hardware will include identification of the

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corrective actions necessary to resolve safety-significant hardware deficiencies.

The collective evaluation report relating to the DAP will be called the Final Design Adequacy Program Report and will include identification of improvements needed for future CPSES design activities and identification of corrective actions needed to resolve design deficiencies.

o Collective Significance Report

A collective significance evaluation will focus on the integrated impact of the identified deficiencies, both specific and programmatic, on the design, construction, and testing of CPSES. This evaluation will be conducted by the Senior Review Team (SRT), which consists of a senior TUGCO line manager and senior industry consultants and which has been established with overall responsibility for the development and implementation of the CPRT program. The CPRT Program Director is an ex-officio member of the SRT.

The staff finds that the CPRT's description of methods for documenting the results of their efforts--in results reports, collective evaluation reports, and the collective significance report--will provide for an organized approach to document results that will ensure that an auditable and complete record is established of the CPRT program findings as well as their final resolution concerning them. The staff will review these reports as they become available and report its findings.

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2.0 QUALITY OF CONSTRUCTION

The adequacy of the construction quality assurance/quality control (QA/QC) program and the quality of construction performed within the scope of that program have been questioned by a number of sources external to Texas Utilities Electric Company (TUEC). The Comanche Peak Response Team (CPRT) has been charged by TUEC with responding to and resolving these concerns. This section of the Supplemental Safety Evaluation Report (SSER) documents the staff evaluation of the CPRT-formulated program for evaluating questions concerning construction QA/QC and the adequacy of installed hardware.

The CPRT's objectives for the Issue-Specific Action Plans (ISAPs) and the Quality of Construction and QA/QC Adequacy (QOC) Program are to identify and resolve all of the construction and QA/QC-related external source issues, assess in an integrated fashion all identified deficiencies and adverse trends of deviations, and to make a statement about the adequacy of construction at Comanche Peak Steam Electric Station (CPSES). In addition to addressing the external source issues, the ISAPs include a sample reinspection of hardware or documentation that is intended to be representative of all the safety-related work performed by all vendors and other organizations' activities conducted during the construction of CPSES. The CPRT's program has the following three components:

- o identification and resolution of external source issues
- o root-cause evaluation and generic implication assessment for each identified deficiency or trend of deviations
- o self-initiated reinspection and documentation review of a representative sample of QC accepted safety-related work activities

The objective of the staff's evaluation is to ascertain whether the CPRT Program Plan describes an acceptable process for accomplishing the objectives of the three components listed above. Subsequent sections of this SSER address both the CPRT-proposed process and the staff's evaluation of this process. In performing this evaluation the staff conducted document reviews and audits and participated in public meetings for the purposes of understanding the details of the ISAP and QOC program process, determining whether an auditable trail existed, and ascertaining whether the proposed process was adequate to meet the Program Plan objectives.

2.1 External Source Issues

Concerns regarding the adequacy of the CPSES construction QA/QC program and the adequacy of the constructed safety-related hardware have been raised by a number of sources external to TUEC [referred to as external source issues (ESIs)]. Two components have been established to resolve and bound the safety-significant implications of any ESI deficiency in either the hardware or the CPSES QA/QC construction program. First, the CPRT will evaluate each ESI by determining the scope of any deficiencies and adverse trends of deviations and the corrective actions necessary to resolve them. This process includes,

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as appropriate, reinspection of hardware sampled in accordance with Appendix D (CPRT Program Plan), documentation review, engineering analysis and evaluation, assessment of TUEC corrective action programs, and an evaluation of data collected from other CPRT review team action plans. Second, the CPRT will determine the root cause of each discovered deficiency or adverse trend of deviations. It will analyze the generic implications of each root cause in order to determine the extent of any additional hardware or QA/QC documentation that might be deficient for the same programmatic reasons and to determine if changes need to be made in ongoing programs to prevent recurrence in the future (further details of this second component are explained and evaluated in Section 1.6 of this SSER).

Issue-Specific Action Plans (ISAPs) describe the CPRT Program Plan for resolving each of the ESIs. All construction and QA/QC issues (including those identified in Appendix P of Supplement 11 of the CPSES Safety Evaluation Report), whether of a hardware nature or a QA/QC programmatic concern, will be the subject of an ISAP. A single ISAP (VII.c) also describes the process and methodology for the CPRT's self-initiated hardware reinspection and documentation review which is discussed in Section 2.2 below. The ISAP evaluation process is initiated by defining the scope of the issue and the methodology for resolving the issue. Procedures and checklists are then developed as guidance for the reinspection effort and document review. Following implementation, a results report is prepared for each ISAP documenting the CPRT's evaluation of each individual issue. Should additional issues be identified either by other external sources or by the CPRT, a new ISAP would be prepared for resolving the new issue or an existing ISAP would be expanded, as indicated in Appendix B the CPRT Program Plan. CPRT proposes to integrate and collectively evaluate the findings from its ESI evaluations with the results of the self-initiated program in order to make a statement about construction quality at CPSES.

Three reports will be prepared in addition to the individual action plan results reports to document the results of the integrated evaluation. Two collective evaluation reports will be prepared to address the adequacy of the construction QA/QC program and the quality of installed hardware. Finally, a summary report will integrate the results of the two collective evaluation reports for all ISAPs and state the CPRT's conclusions regarding the Quality of Construction and QA/QC Adequacy Program at CPSES. Any information that may be related to design adequacy which is identified during implementation of an ISAP will be referred to CPRT personnel responsible for implementing the Design Adequacy Program (DAP).

To ensure that all issues/concerns from external sources are addressed, the CPRT will develop a matrix that provides a cross-reference between each issue/concern and the action plan(s) that addresses it. This matrix will also serve as an aid in the collective evaluation process. The matrix format will present such information that a valid concern can be tracked to the appropriate criteria of 10 CFR 50, Appendix B, and/or hardware area, and tracked to the ISAP covering the concern.

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2.2 Self-Initiated Construction Program

The self-initiated evaluation of construction adequacy is described in ISAP VII.c. This action plan describes the proposed CPRT reinspection and documentation review of a representative sample of completed and QC-accepted safety-related construction work activities performed at CPSES. The objective of this effort is to provide confidence that there are no unidentified programmatic deficiencies related to the quality of construction of the hardware at CPSES. Accordingly, it will provide confidence concerning the adequacy of the QA/QC program. The CPRT program consists of a reinspection of a representative sample of safety-related installed hardware which has been inspected and accepted by CPSES QC personnel for Units 1, 2, and their common areas, or documentation reviews of inaccessible hardware attributes. Construction activities are organized into three disciplines as follows:

- civil/structural
- electrical
- mechanical/piping

The methodology for the self-initiated construction adequacy review consists of establishing reasonably homogeneous populations based on construction work activities by reviewing applicable drawings and specifications, codes and standards, work and inspection procedures, and by identifying organizations and type of crafts who performed the work. The populations are then sampled and evaluated by means of physical reinspections of safety-related attributes or documentation reviews of inaccessible attributes. The results of these evaluations with conclusions drawn will be documented in results reports.

The self-initiated review begins with the categorization of all safety-related hardware into populations from which samples can be drawn and which are supported by work activities (WAs). Population and work activity descriptions are prepared for each construction category. The population description gives the boundaries of the population; the work activity describes the process required to install or construct a certain category of hardware. Attributes associated with each work activity are established on the bases of the provisions of installation and inspection procedures and/or specifications used for installation of the subject hardware.

For each population, two random samples will be selected in accordance with the procedure in Appendix D of the CPRT Program Plan. The first sample is derived from the total population; the second sample (which is essentially an expansion of the first) is drawn from that portion of the total population which is defined by the CPRT as having greater importance to safety.

In parallel with the sample selection, checklists and inspection procedures are developed from the attributes used to characterize each work activity. Both reinspection and documentation review checklists are developed from the quality instructions prepared by the CPRT. Verification packages are then assembled for each sample item to facilitate reinspection or documentation review. Any deviations identified as a result of a reinspection or a documentation review are documented in a deviation report which will then be evaluated to determine the safety-significance of the deviation. In addition, all deviations are

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collectively evaluated for adverse trends. An action plan results report documenting the overall results of the inspections for all populations is the vehicle for documenting the results and evaluations of this ISAP. Any information that may be related to design adequacy which is identified during implementation of this ISAP will be referred to CPRT personnel responsible for implementing the DAP.

2.3 CPRT Program Plan Appendix D Sampling Procedure

The sample size for each population is targeted in Appendix D of the CPRT Program Plan to meet a 95/5 confidence level. The 95/5 assurance is interpreted to mean that there is a 95 percent probability that the population contains less than 5 percent deficiencies. CPRT selected this as an acceptable level of assurance for providing important evidence concerning programmatic or systematic deficiencies in the safety-related construction of CPSES.

For each population, a minimum sample size of 60 items is selected at random. Each item is then inspected against each of the attributes associated with each WA in the population. Furthermore, any one of the attributes applicable to a selected item that cannot be inspected because it is inaccessible in the plant will be disregarded and replaced by another item selected at random from the same population. In addition, during onsite audits of the ISAPs and the QOC program, the staff determined that the sample will be augmented as necessary to ensure that each attribute associated with a WA is reinspected at least as many times as the number of items in the sample size selected.

If no deficiencies or adverse trend of deviations (to be considered as deficiencies in the ensuing discussion) are found in the sample, the entire population is accepted. However, if one deficiency is identified for any one of the WA attributes in the initial sample of items and no root cause is identified, the initial sample will be expanded to include the review of all attributes for 35 additional items selected at random. If no further deficiencies are found among the 35 additional items selected, the entire population is accepted. If one more deficiency associated with a different attribute is detected in the expanded sample and cannot be associated with a specific stratum, 100 percent of the population will be inspected for all the attributes. If two deficiencies for the same attribute and the same root cause are identified in the initial sample, 100 percent of the population will be inspected for that attribute, according to the CPRT Program Plan. Neither Appendix B nor D of the CPRT Program Plan discusses the process that will be followed if a deficiency found in the initial or expanded sample can be associated with a specific stratum. This process should follow the same ground rules as those used for establishing the original population for ensuring the homogeneity of the new stratified population, as related to the newly identified factors affecting the attribute. Attribute coverage equal to the number of items in the sample size selected and inaccessibility of the attribute will be handled in the new stratum in the same manner as discussed before for the initial population.

If one deficiency is identified in the initial sample and a root cause is identified, then the initial sample is expanded along two parallel paths. First, a stratum containing those items with the suspect attribute is defined and that attribute (or a reduced set of attributes in the case of ISAP VII.c) in that stratum is reviewed. Items from the initial sample falling into the

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newly defined stratum are removed from the initial sample and placed into a new sample, and the new sample is expanded by randomly selecting items in the stratum until a total of 95 items is reached. If no additional deficiencies are detected in the new sample of 95, the new population is accepted. On the other hand, if one more deficiency is detected in the new sample, and no different root cause is identified for this deficiency, then 100 percent of the stratified population is inspected. However, if a different root cause associated with the second deficiency is identified, a second stratum may be established and sampling may continue in the second stratum. The process for establishing new strata will continue until no more different root causes are found in the strata under inspection, or until the sample size is so small (less than 45 items) that 100 percent inspection of the remaining items would be required. Second, in the original population without the suspect strata, the corresponding sample is augmented to the initial sample size and accepted if no other different deficiencies are identified.

Almost all of the statistical tests described in the ISAPs are directed toward "binomial" populations in which the sample attributes are examined and determined to be "acceptable" or "not acceptable." The statistical methodology for sampling binomial attributes is described in Attachment 2 to Appendix D (CPRT Program Plan). In special cases, however, the inspected items are measured on an interval (continuous) scale. If these measurements follow the normal distribution (or the log-normal distribution), they are evaluated using a statistical methodology known as "tolerance limits." The procedure for constructing tolerance limits is given in Appendix D, Attachment 2. It should be pointed out that the number of CPRT activities in which tolerance limits are used is very limited. In addition, although the level of assurance is always set by the CPRT at 95 percent, the level of protection (percent of the population that must lie within given bounds) is determined by the CPRT on a case-by-case basis.

2.4 Staff Evaluation

The staff reviewed the applicable sections of the Program Plan and each individual ISAP, including the ISAP describing the self-initiated evaluation program, for the purpose of ascertaining if the CPRT's Construction Adequacy Program can accomplish its stated objectives (see CPRT Program Plan, Appendix B, page 2). In addition to the review of each individual ISAP, onsite audits of the documentation being prepared in support of ESI resolution and of the self-initiated evaluation program were performed for the purpose of developing an understanding of the CPRT process. These audits also served to establish that the CPRT was documenting construction adequacy evaluation activities in sufficient detail to permit audit now or in the future. The staff also reviewed Appendix D (CPRT Program Plan), which contains CPRT's proposed sampling approach, to determine if its application to the CPSES reinspection/document review program would lead to conclusions regarding the existence of programmatic deficiencies.

Specific comments pertaining to the staff review of the overall QOC program and certain ISAPs are provided in Appendix B to this SSER. The ISAPs are the subject of the staff's ongoing evaluation and inspection during the CPRT's implementation phase of the program. As the CPRT issues results reports describing the implementation of each ISAP, the staff will complete its evaluation of these action plans.

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2.4.1 Evaluation of External Source Issues (ISAP Process)

Review of external source issues has been organized into categories similar to the NRC's Technical Review Team categories and includes the following disciplines:

- o electrical and instrumentation
- o testing program
- o mechanical, piping, and miscellaneous
- o civil and structural
- o QA/QC

The scope of each ISAP contained in the CPRT Program Plan has been reviewed by the staff for the purpose of comparing its content with that required by the ISAP format (Attachment 3 to CPRT Program Plan) and its scope with the issue requiring resolution. The format required by the CPRT describes the elements of the ISAP process and includes:

- o description of the issue
- o actions identified by the NRC
- o background
- o CPRT action plan

The ISAP format also provides guidance for the development of the CPRT action plan. For example, the approach to resolution, the required tasks, and assessment for potential generic implications must all be included in the CPRT action plan. Also, applicable procedures, responsible organizations, personnel qualification, and acceptance and decision criteria must be addressed in each ISAP to comply with the CPRT's specified ISAP format. Furthermore, ISAPs are to be implemented in accordance with the CPRT's QA program; and the status of each ISAP will be monitored through the CPRT program records and will be documented in a results report. Based upon the assessment of the ISAP format, which essentially describes the CPRT's process for resolving issues, the staff finds that this process contains the elements necessary for systematically addressing issues raised by external sources, as well as any specific issues which may be identified by the CPRT or other external sources in the future. The staff finds the individual ISAPs are responsive to the issues based on the staff's technical review of each ISAP, since they adhere to the ISAP format and address the specific concerns by means of a systematic approach to resolution. Specific comments on certain ISAPs are provided in Appendix B to this SSER.

2.4.2 Evaluation of Self-Initiated Construction Program

The staff reviewed the CPRT's process for its self-initiated program to determine if it would accomplish its stated objecitives. The review was accomplished by a multidisciplinary team encompassing most of the disciplines noted before for addressing external source issues. This review, which included onsite audits, examined the homogeneous populations and related work activities to develop an understanding of the CPRT's self-initiated program, to ensure that an auditable trail existed, and to determine if the same procedure was being applied to all disciplines. The staff found the documentation of the populations to be compatible with the CPRT's plan described in ISAP VII.c and found

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the development of the inspection checklists and the documentation associated with this process to be consistent for all populations. The staff further found that the documentation was adequate to ensure that this process could be audited in the future. The basis, descriptions, items list, and work activity definition for most populations was reviewed and found to be acceptable since they properly addressed the concept of homogeneity and were documented to enable evaluation of the work activities and their accompanying attributes. Further evaluation revealed that the populations were initially organized into WAs based upon their technical attributes. The staff reviewed the process for selecting the technical attributes, audited the attributes selected for inspection for certain populations, and determined that the process employed is sufficient to provide important evidence about the quality of the installed hardware, irrespective of human and administrative factors. The homogeneity of the populations will be investigated during the implementation of the program as part of the root-cause determination of identified problems.

It was noted in Section 2.3 that the Program Plan did not provide the required specificity to permit an independent evaluation of the process to be followed in the stratification of a population into a newly defined stratum that ensures reasonable homogeneity of the new stratum, as related to the newly identified factors affecting the attribute. The staff will consider acceptable a process to establish new homogeneous strata which follow the same ground rules as those used for establishing the original population. The staff will address the adequacy of newly defined stratum in its evaluation of the applicant's results reports.

The CPRT's self-initiated construction evaluation program commits to performing root-cause evaluations and generic-implication assessments of deficiencies and adverse trends of deviations. In addition, adverse trends will be investigated to identify trend boundaries and to determine the effect of the trend on other areas if applicable. Closed ESIs will be considered in the process used for trending and root-cause and generic-implication evaluations.

Subject to the satisfactory resolution of the matter regarding population restratification during implementation of the CPRT Program Plan, the staff considers the CPRT's self-initiated program an important contributor for evaluation of the adequacy of construction at CPSES and is acceptable because it:

(1) establishes a 95/5 targeted level of assurance, which should provide important evidence concerning programmatic or systematic deficiencies in the safety-related construction of CPSES.

(2) employs a reasonable procedure to determine homogenous populations for sampling based on WAs and related attributes

(3) provides for a 100 percent reinspection of a population if two or more deficiencies of the same type are detected in the inspected sample

(4) requires root-cause evaluation and generic-implication assessments of deficiencies as well as adverse trends of deviations

(5) is documented in a manner suitable for audit now and in the future

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(6) is a structured process which complies with the CPRT's ISAP format

(7) employs a conventional sampling process accepted in the industry (evaluated in Section 2.4.3 below).

2.4.3 Evaluation of Sampling (Appendix D of CPRT Program Plan)

The staff evaluation of the sampling process employed by the CPRT to address some ESIs and to perform its self-initiated program for providing evidence concerning the quality of construction is based on:

- o review of the CPRT Program Plan
- o onsite technical audits
- o meetings with personnel responsible for implementing the self-initiated program
- o discussions at the public meetings

The staff evaluation first discusses the Appendix D sampling process, including the assumptions associated with a binomial population, followed by an evaluation of the assurance level proposed by the CPRT. The staff evaluation concludes with a discussion of the differences it perceives between the sampling process described in Appendix D and that discussed in the public meetings and during the onsite technical audits.

The sampling procedure is based on assumptions that characterize a binomial population (i.e., an item or attribute is acceptable or not acceptable). These assumptions include (1) homogeneity of items within a population, (2) random selection of sample items from a population, and (3) the number of items in the population is essentially infinite.

The homogeneity of the various populations, required by assumption 1, is determined and justified by engineering considerations undertaken by the CPRT. Homogeneity is a necessary property for a population which assumes that each of the external factors which affect the attributes of interest is represented in the sampling process. If it is determined during the evaluation of the sampling process results that the population of interest is not homogeneous, then the population is subdivided, new population boundaries are drawn based on applicable WAs, and samples are selected at random from each of the newly established populations.

As required by assumption 2, items are selected from the population through a random sampling procedure. The CPRT describes this procedure in Attachment 3 of Appendix D. The random selection can be made using either a table of random digits or a calculator/computer random number generator. The staff has reviewed the CPRT's process for random selection and has determined that it provides for random selection of elements from a population.

Assumption 3, an infinite number of items in the population, is not met since all populations are finite in size. However, by assuming an infinite population, the sample is larger than required, and thus the actual level of assurance is larger than would otherwise be calculated.

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The level of assurance for the Appendix D sampling program for populations with binomial attributes can be calculated by one of two approaches. The applicant uses the "Bayesian" approach and computes a 95/5 target level of assurance. The premises in the Bayesian approach are that the true proportion of deficiencies in the population is not known, nor is the probability distribution for the number of deficiencies in the sample. Accordingly, as the sample information is updated, the probability distribution for the population is also updated. The alternative approach, called the "classical" approach, sets the proportion of deficiencies in the population at the 5 percent level, which is the maximum acceptable risk, and the associated probability distribution is defined by this proportion.

As expected, the two approaches yield somewhat different numerical values for the level of assurance associated with the same sampling plan. The CPRT sampling plan described in the previous section would provide 95/5 assurance by the Bayesian methodology. On the other hand, because the CPRT sampling plan allows for an expansion in cases where a single deficiency is identified (with no root cause identified), the classical approach calculates the level of assurance as 93/5. (The 93 percent assurance is obtained from adding probabilities associated with two mutually exclusive events: (1) finding no deficiencies in a sample of 60 and (2) finding one deficiency in a sample of 60 followed by finding no deficiencies in a sample of 35.)

It should be noted that the level of assurance provided by the CPRT sampling plan is calculated to be at least 93/5. However, this level of assurance is likely to be higher because of the following reasons:

(1) As previously noted, the initial sample is supplemented by another sample drawn from that portion of the population having greater importance to safety. This offers the CPRT an additional opportunity to detect deficiencies and reject the population, which in effect increases the level of assurance.

(2) Under assumption 3, the population size is taken as infinite. For CPSES populations, this assumption leads to sample sizes that are larger than necessary, and hence the assurance is larger than calculated.

(3) When a deficiency or an adverse trend is identified, the CPRT Program Plan calls for further sampling. This activity increases the sample size, generally giving a still greater assurance.

Based on onsite technical audits, meetings with personnel responsible for executing the self-initiated evaluation program, and discussions at public meetings, the staff acquired an understanding of the sampling process which is different in one respect from that described in Appendix D of the CPRT Program Plan. The process perceived by the staff was based on the assumption that the populations were reasonably homogeneous and the first identified deficiency in the initial sam le will be considered an isolated case if no other deficiencies are found in the remainder of the initial sample or the expanded sample. If two deficiencies were identified, irrespective of whether or not they were

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associated with the same attribute, 100 percent of the population would be inspected for all the attributes. It was also understood that the first deficiency was to be analyzed for root cause and generic implications, based on discussions with the CPRT.

The process presented in Appendix D is consistent with this concept perceived by the staff of homogeneity of the populations, but it is different in one aspect concerning the determination of the root cause for the identified deficiencies to be followed, if required, by the stratification of the population, before committing to 100 percent inspection. This provides for the reexamination of the attributes associated with the initial WAs. If factors affecting these attributes are found, then the staff will require that the original population be restructured to account for the newly identified factors affecting the attribute.

The staff considers Appendix D an effective process to support the self-initiated evaluation and to validate the reasonableness of the homogeneity for the initial populations. The staff will verify compliance with the requirement to restructure the original populations, if needed, to account for the newly identified factors affecting the attribute in its evaluation of the CPRT's results reports.

The staff considers the overall sampling process presented in Appendix D to be effective because it adheres to assumptions required for implementation of the sampling process, and provides for an organized approach to be followed during the implementation of the program.

2.4.4 Overall Assessment of the CPRT Program Plan for Evaluating Construction Adequacy

The staff has determined that the CPRT Program Plan presents an acceptable approach for accomplishing the objectives of the three components of the CPRT program stated in Section 2.0 of this SSER. However, the staff needs more information about the integration of these three components in order to develop a perspective about the comprehensiveness of the scope to permit an assessment of the extrapolation to all the hardware at CPSES, based on the findings and resolutions related to the items inspected. Therefore, the staff requires that the CPRT supplement the matrix referred to in Section 2.1 of this report to correlate attributes to be inspected (or that have been inspected) to the associated hardware populations. This should consider all attributes related to all open and closed external source issues and the self-initiated evaluation. The staff will evaluate this information during the implementation phase of the program and report its findings.

2.5 Conclusion

Based on the foregoing evaluation, the staff concludes that the construction adequacy program provides an acceptable process for resolving all current and any future external source issues.

With regard to the self-initiated construction adequacy program, the staff concludes that this program documents an acceptable process for providing important evidence concerning the quality of construction. Also, the staff

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finds acceptable the methodology of the sampling process employed by the CPRT to address some ESIs and to perform its self-initiated evaluation. Specific application of sampling will continue to be audited by the staff during the implementation of the program.

The staff will evaluate the resolution of all matters identified in its evaluation during the implementation phase of the CPRT Program Plan.

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3.0 DESIGN ADEQUACY

Concerns regarding the adequacy of the design and/or design process of the Comanche Peak Steam Electric Station (CPSES) have been raised by a number of sources external to Texas Utilities Electric Company (TUEC). The Comanche Peak Response Team (CPRT) has been charged with responding to and resolving the issues raised by these concerns. This section of the Supplemental Safety Evaluation Report (SSER) documents the staff evaluation of the CPRT-formulated Design Adequacy Program (DAP) for resolving these issues about the adequacy of the CPSES design and/or design process.

The CPRT's objectives for the DAP are to identify and resolve all design-related issues, to assess these issues in an integrated fashion, and to make a statement about the adequacy of the CPSES design and design process. In addition to addressing the external source issues (ESIs), the DAP includes a self-initiated evaluation involving reviews of designs that are intended to be representative of all the architect/engineer (A/E) safety-related scope of design for CPSES (regardless of whether performed by Gibbs and Hill, Texas Utilities Generating Company (TUGCO), or design-service contractors) referred to as balance-of-plant (BOP) design in the ensuing discussion. Design by equipment vendors that have experience in supplying safety-related hardware to the industry (e.g., Westinghouse) are excluded from the scope of review. The CPRT Program Plan documents that the nuclear steam supply system (NSSS) design (Westinghouse design responsibility) is excluded because it is a proven design that has been thoroughly reviewed and audited on numerous occasions by independent individuals and/or groups. The CPRT Program Plan also indicates that other experienced vendors are not considered because the design adequacy of their safety-related equipment has been demonstrated through use over a number of years in operating nuclear power plants. However, DAP considers all design interfaces between the A/E and Westinghouse and other vendors. The CPRT DAP for accomplishing these objectives has three components:

- identification and resolution of issues raised by external sources
- investigation of root cause and analysis of generic implications for each identified deficiency, or trend of deviations or observations
- performance of a self-initiated evaluation of design activities

The objective of the staff's evaluation is to ascertain if the CPRT Program Plan describes an acceptable framework and process for accomplishing the objectives of the three components listed above. In performing this evaluation, the staff conducted document reviews and audits and participated in public meetings for the purpose of understanding the details of the DAP process, determining whether an auditable trail existed, and ascertaining that the proposed process was adequate to meet the Program Plan objectives.

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3.1 Design Adequacy Discipline-Specific Action Plans

The CPRT has organized its evaluation of CPSES design adequacy into Discipline-Specific Action Plans (DSAPs). Each DSAP contains one or more of the following tasks:

- o Address specific design issues identified by external sources.
- o Implement the CPRT's self-initiated design evaluations.
- o Address special piping/pipe supports and cable tray/conduit supports programs that will result in a significant level of reanalysis.

DSAPs contain initiatives or review techniques that are designed both to respond to specific concerns in a given design area and/or to implement a portion of the self-initiated evaluation in the same area.

The DSAPs are developed for evaluating the following design disciplines:

- o civil/structural
- o piping/supports
- o mechanical systems and components
- o electrical/instrumentation and control systems and components

DSAPs addressing external source issues will employ one or more of the following initiatives or review techniques which are described in detail on pages 12 through 14 of Appendix A of the CPRT Program Plan: verification of project evaluations, engineering evaluations, engineering walkdowns, hardware inspections, special studies, testing, direct hardware modifications, reanalysis on a sampling basis, and complete reanalysis of affected design. Another review technique used in the DSAPs addressing the self-initiated evaluation of the design involved technical checklists for the review of design activities. Regardless of the evaluation method employed, the identified findings from ESIs and the self-initiated evaluation will be classified by the CPRT as either observations, deviations, or deficiencies. In addition, the CPRT Program Plan requires that trends of observations and deviations be maintained and deviations be assessed for safety significance. The definition of design discrepancies and a detailed discussion of the safety significance evaluation process is provided in Section 1.5 of this SSER and in Appendix E of the CPRT Program Plan.

The CPRT Program Plan also states that all deficiencies will be evaluated to determine the potential generic implications of root causes. Additional evaluations may be required to determine the bounds of the root cause and existence of generic implications. Details of the DAP generic-implications evaluation process are presented in Attachment 5 to Appendix A of the CPRT Program Plan. The staff's evaluation of the CPRT process for determination of root causes and generic implications is presented in Section 1.6 of this SSER. CPRT proposes to integrate and collectively evaluate the findings from all DSAPs in order to make a statement about the adequacy of the design and design process at CPSES.

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Individual DSAP Results Reports will be prepared in addition to the third-party results reports for the piping and pipe supports, and cable tray and conduit supports design verification efforts. Finally, a summary report will present the results of the collective evaluation regarding the adequacy of the design and design process at CPSES. Any information that may be related to the adequacy of construction and construction process which is identified during the implementation of a DSAP will be referred to CPRT personnel responsible for implementing the ISAPs.

The CPRT proposed process for evaluating each DSAP and the staff's evaluation of this process are presented in subsequent sections of this SSER. Also described and evaluated in this SSER is the CPRT evaluation process associated with the piping/supports discipline and partially with the civil/structural discipline which entails an extensive reanalysis of piping, piping supports, and cable tray and conduit supports. The CPRT will evaluate each of the specific design and design process issues to determine the nature of any deficiency and the corrective actions necessary to resolve them.

3.2 External Source Issues

Concerns regarding the adequacy of the CPSES design and/or design process have been raised by a number of sources external to TUEC and are referred to as external source issues.

The CPRT Program Plan employs a six-step methodology to respond to ESIs. This methodology identifies issues and categorizes them by discipline and design activity, and provides for their evaluation and final resolution. First, issues are identified by a review of the various documents and reports associated with audits, reviews, and inspections that have been performed. The review is intended to gather the necessary background information about an issue, as well as to identify any associated issues. Second, identified issues are further defined as follows:

- o detailed review of available documentation
- o identification of potentially affected hardware
- o nature of programmatic issues

Based on this further definition, the CPRT will determine if additional evaluation or corrective action for the issue is warranted. Third, the issues or group of related issues are assigned to an Issue-Specific Action Plan (ISAP) and/or Discipline-Specific Action Plan (DSAP). Action plan tasks are developed addressing the appropriate initiatives mentioned in Section 3.1 of this SSER for resolving the issue or group of issues. Fourth, the action plans are implemented to evaluate the adequacy of the CPSES design and design process relative to the identified issues. Fifth, the need for corrective action will be determined when design deviations and deficiencies are known. Corrective action can also be determined at the time of action plan development if it is established to be more efficient to do so. Sixth, on completion of action plans, a results report is prepared.

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3.3 Self-Initiated Design Program

The self-initiated design evaluations extend beyond the scope of the ESIs. The CPRT's objective in this effort is intended to provide confidence that there are no undetected and uncorrected deficiencies in the design of CPSES. The self-initiated evaluation involves verification of selected designs and their processes that are intended to be representative of all safety-related engineering processes or design activities within the BOP design scope for CPSES. The DAP methodology focuses on verification of design outputs (i.e., designs represented on drawings, and in specifications, calculations, engineering analyses, etc.) of these engineering processes or design activities rather than on verification of the QA program and associated documentation governing them.

According to CPRT, confirmation that a design meets specified design criteria and commitments will constitute design verification and reasonable assurance that the associated engineering process or design activity was executed adequately. The CPRT Program Plan states that coverage of the essential processes or design activities coupled with the DAP verification of designs representative of these processes will provide the bases for extrapolating the results to other designs as the processes producing these designs will have been confirmed.

The scope development process for the self-inititated design evaluation is described in Attachment 4 to Appendix A of the CPRT Program Plan. This process results in the establishment of matrices defining the breadth of the initial scope for each discipline and are contained in the respective DSAPs presented in Appendix C of the CPRT Program Plan. The depth of the review scope will be established through the development of detailed checklists. A typical DSAP's scope includes a review of the design inputs (criteria), an evaluation of implementing documents (e.g., calculations and analyses), and a review of design output documents (e.g., drawings, specifications, and supplier documents). The DAP may consider engineering walkdowns to supplement the review of implementing documents, to assess the overall adequacy of design features, and to support the conclusions reached following the design activity review. Where particular design aspects are demonstrated to be adequate by the CPSES testing program, the test results may be used to replace or complement a design review for those particular design aspects.

Based on the initial scope matrices for each DSAP, a methodology for the self-initiated design review was instituted by the CPRT to establish initial reasonable homogeneous design activities (HDAs). An HDA is a collection of individual design outputs produced by a design activity which exhibits similarity in the following attributes:

- o criteria
- o design considerations, approach, and methodology
- o performing organization/discipline
- o design control process
- o design interfaces

A detailed description of each attribute is presented in Attachment 4 of Appendix A to the CPRT Program Plan. The purpose of each attribute is summarized in the next paragraph.

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The criteria attribute includes design criteria that are viewed as having similar considerations and application. The attribute addressing design considerations, approach, and methodology includes design or analysis, approaches, methodologies, or mechanics in implementation of the design so that meaningful differences in design complexities or considerations are not contained within the subject design activity. The performing organization/discipline attribute addresses the consideration for the same organization or discipline performing the particular design activity. The attribute addressing the design control process establishes that similar control procedures were used for the design process that governed the performance of the subject design activity. The design interfaces attribute applies to discipline design interfaces within Gibbs and Hill and addresses consistency in the transferring of information and provisions for design input.

After the HDAs were defined, they were reviewed by the CPRT to identify "givens." A "given" is defined by the CPRT to be any design activity, design criterion, or area of design that is considered correct and that will not be reviewed under DAP. An item considered correct based on proven acceptance by the industry and/or NRC is called a "generic given" (e.g., internal NSSS design scope). "Candidate givens" are those that are based on a design element that has received an independent technical review in the past that is comparable to that provided under the DSAP. Additional detailed information concerning examples and guidelines for identifying "givens" is provided in Section 3.0 of Attachment 4 to Appendix A of the CPRT Program Plan.

According to the CPRT Program Plan, the ability of the DAP to extrapolate results to all work encompassed in an HDA based on the design verification of selected samples of work performed within that HDA depends upon the confirmation during the implementation of the DAP of the following considerations:

- o confirmation that within each HDA reasonable similarity exists regarding the five attributes for homogeneity

- o selection of specific designs for review within each HDA that are considered to be representative [The CPRT indicated during the staff's technical audits of the DAP that a single item, design or occupant (e.g., calculation, drawing, specification, analysis, etc.) will be initially selected for review in each HDA and the design is considered representative, if such an occupant bounds, in comprehensiveness and/or complexity, its counterparts contained within that HDA.]

- o selection of an appropriate number of specific designs for review within each HDA to ensure proper coverage of larger populations [According to the CPRT, the number of items to be selected for review will be based on engineering judgment.]

The CPRT proposes the following approach to confirm the validity of each HDA during the implementation phase of DAP:

- o Items or occupants which exhibit reasonable similarity relative to the five attributes for homogeneity are identified within each design activity. [The CPRT indicated during the staff's technical audits of the DAP that this identification will be accomplished before implementation begins.]

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- o A minimum of five occupants will be selected that are evenly spaced with respect to the time that they were produced.

- o Each of the five occupants selected will be scanned to confirm homogeneity relative to criteria, design considerations, approach, and methodology.

- o Where attribute differences are identified, the design activity will be subdivided into additional design activities until occupant similarity to all the attributes for homogeneity is achieved.

The HDAs have been grouped into review topic areas (e.g., electrical load capacity, emergency lighting, overpressure protection) for which review checklists will be developed. The checklists correlate design criteria with specific documents to be reviewed and provide the technical basis for review and documentation of the actual review scope accompanied by references and findings.

According to the DAP, the final scope for the self-initiated design evaluation is the summation of the initial plus the validated scopes and any scope additions resulting from deficiencies, or trends of deviations or observations identified in the course of action plan implementation.

3.4 Piping and Pipe Support and Cable Tray/Conduit Support Design Verification

The action plan initiatives described in Section 3.1 of this SSER relating to reanalysis on a sampling basis and complete reanalysis of affected design are included as a portion of DSAP VIII (civil/structural) in the area of cable tray/conduit supports and as a portion of DSAP IX (piping and supports). These action plan initiatives were developed to resolve the large number of ESIs associated with these design areas and have resulted in a significant level of design reanalysis. The applicant has retained contractors not involved with the original design to perform the requalification program for piping and pipe supports (Stone & Webster Engineering Corporation (SWEC)) and cable tray/conduit supports (Ebasco Services Inc. and Impell). The details of the piping and pipe support program are described in DSAP IX. The cable tray/conduit support program is described in DSAP VIII. These initiatives are summarized in the following sections.

3.4.1 Cable Tray and Conduit Supports

The applicant is performing 100 percent verification reviews of the cable tray support designs. All Unit 2 analysis/design verification work will be performed by Ebasco. Unit 1 work will be divided between Ebasco and Impell. In addition, a CPRT third-party overview of this effort is being conducted by TERA Corporation to provide assurance that the objectives of the DAP in the cable tray and conduit support area are being achieved. This program includes: the development of as-built drawings for all cable tray supports; analysis and design review of all cable tray supports to criteria that are responsive to external source design concerns and in compliance with CPSES licensing commitments; testing to verify and/or establish specific component or system behavior characteristics; and hardware modifications as necessary to ensure final acceptability of all supports.

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The CPRT Program Plan indicates that all cable tray supports in both units will be as-built verified by the CPSES personnel for all accessible attributes. For Unit 2, where virtually all attributes are accessible, an as-built drawing will be developed for each support. For Unit 1, a number of the support design attributes are inaccessible as a result of congestion or the presence of fire-protection material. An alternate approach, therefore, will be taken in developing the as-built drawings. This approach will develop as-designed drawings based on the original Gibbs and Hill design plus all documented design changes. Field walkdowns will then be performed using the as-designed drawings. For all accessible supports and accessible portions of partially inaccessible supports, as-built conditions will be confirmed or differences will be noted. Final as-built drawings will note items that were inaccessible. The determination of span lengths will also be developed based on field inspections. The basis for design review of inaccessible items for Units 1 and 2 will be addressed and documented in special studies or evaluation reports.

Dynamic analysis methods will be employed in the design verification process for cable tray supports for Unit 1. Both Ebasco and Impell will utilize their own design procedures for performing the work; however, design methods and criteria will be consistent. For both units, loading combinations and stress limits will be checked in accordance with acceptance criteria conforming to CPSES licensing commitments. For any support that fails to meet these criteria, design modifications will be prepared that result in acceptable qualification. A testing program has been defined to support the cable tray support verification effort. The objectives of these tests are to determine actual damping levels to verify applicability of values used in the design of cable tray systems, to confirm the response of members acting primarily in tension under seismically induced compression loads, and to confirm the analytical methods and supporting design assumptions for complicated load-path geometries. Modifications will be prepared for all cable tray supports that fail to meet specified acceptance criteria. All supports will be qualified in their existing state, or required modifications will be implemented.

The applicant has also developed a program to review conduit supports. Under this program, the applicant has retained Ebasco to perform the design verification for all Unit 2 conduit supports.

A two-step approach for verifying the design adequacy of Unit 1 and common conduit supports will be implemented. First, all supports (including unistruts) with unacceptable configurations will be identified and modified to be in compliance with appropriate criteria. Second, a verification of the as-built Unit 1 and common design conduit runs will be performed using sampling in accordance with Appendix D of the CPRT Program Plan. The design of each sample conduit run will be as-built verified by field inspection to produce conduit-run isometrics and individual support drawings. The design of each selected conduit run and associated supports will be evaluated to determine compliance with specified CPSES licensing commitments. If all sampled conduit runs and associated supports are found to be in compliance with established criteria, no further action will be taken. If one or more conduit runs or associated supports do not meet the established criteria, the results will be reviewed and the sample expanded in accordance with Appendix D of the CPRT Program Plan.

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3.4.2 Piping and Pipe Supports

A number of issues have been raised in the area of piping analysis and pipe support design. These issues originated from several sources, the primary sources being the Cygna Independent Assessment Program, the ASLB hearings, intervenors, and the NRC staff reviews. As a result, the applicant has initiated a piping and pipe support requalification program which has resulted in a significant level of reanalysis and reevaluation of the CPSES piping and pipe support designs. SWEC, under contract to the applicant, will perform this requalification program under the direction of the CPSES project personnel. In addition, the TERA Corporation (TERA) will also review this effort to provide assurance that the objectives of the Design Adequacy Program in the piping and pipe support area are being achieved. The CPRT Program Plan describes the piping and pipe support program and overview in DSAP IX.

The scope of the SWEC program for the requalification of piping and pipe supports includes:

- o 100 percent of all ASME Code Class 2 and 3 piping larger than 2 inches (large bore), excluding portions within the boundary of Westinghouse Class 1 auxiliary branch line stress problems
- o 100 percent of all ASME Code Class 1, 2, and 3 large bore pipe supports
- o small bore piping and pipe supports on a sampling basis
- o all Class 5 piping and pipe supports within ASME Code Class 2 and 3 stress analysis problem boundary
- o all Class 5 supports within the ASME Code Class 1 stress problems

DSAP IX, Attachment 2, describes the SWEC action plan which consists of the following six elements:

(1) development of CPSES pipe stress and pipe support design criteria

(2) verification of existing as-built information

(3) review and verification of system design input, seismic acceleration and fluid transients

(4) verification of existing pipe support design documents

(5) resolution of special technical concerns

(6) reanalysis of piping systems and reevaluation of pipe support designs

Further details of these six elements are presented in Section D of Attachment 2 to DSAP IX.

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3.4.3 Third-Party Review

The CPRT will perform a third-party review of the piping, pipe supports, cable tray, and conduit supports design requalification programs to verify the technical adequacy of the design criteria, methodology, implementation, and corrective actions. This review will be conducted by TERA Corporation, and is separated into the following areas:

- o review of design procedures and supporting analytical studies
- o testing program review and evaluation
- o analysis/calculation verification
- o review of resolutions and modifications
- o evaluation of root causes and generic implications
- o as-built verification

The findings of the third-party review will be documented in results reports.

3.5 Staff Evaluation

The staff reviewed the applicable sections of the Program Plan and each individual DSAP for the purpose of ascertaining if the CPRT's DAP can accomplish its stated objectives (see CPRT Program Plan, Appendix A, page 3). In addition to the review of each DSAP, the documentation being prepared in support of ESI resolution and the self-initiated design evaluation were audited for the purpose of developing an understanding of the CPRT program. These audits were also intended to determine whether the CPRT was documenting design adequacy evaluation activities in sufficient detail to permit audit now or in the future.

Specific comments pertaining to the staff review of the overall DAP and each DSAP are provided in Appendix C to this SSER. The DSAPs are the subject of the staff's ongoing evaluations during the CPRT's implementation phase of the DAP. As the CPRT issues results reports describing the implementation of each DSAP, the staff will complete its evaluation of these action plans.

3.5.1 Evaluation of DAP External Source Issues

The staff reviewed the six-step methodology used by the CPRT for identifying and resolving external source issues, and the adequacy of it was judged against the following staff guidelines:

(1) A process exists for identifying and resolving issues that is consistent and continuous throughout implementation of the DAP.

(2) Each issue identified is addressed and documented individually, including its resolution.

(3) A process exists for evaluating findings from ESIs that is the same as that for findings produced by the self-initiated portion of the DAP.

(4) Each identified finding classified as a deficiency or adverse trend is to be evaluated for root cause and generic implications.

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(5) Each identified finding classified as an observation or deviation is to be included in the process for trend analysis.

(6) A defined process exists for selecting one or more of the initiatives or review techniques (see Section 3.1 of this SSER) that are to be involved during implementation of action plans.

(7) Initiatives or review techniques, or a combination of them, provide for a complete and thorough approach for resolving of issues.

The staff reviewed the process by which ESIs are identified and resolved. The staff determined that this process is consistent and controlled by procedures for screening and sorting issues and for providing control over the issue-resolution process. Also, the staff determined that the CPRT Program Plan documents the commitment for continuous identification and resolution of issues during the implementation phase of the program.

The staff examined the process for evaluating specific issues raised by external sources and determined that the issues are classified in accordance with the findings concerning them, deficiencies and adverse trends are evaluated for root cause and generic implications, and observations or deviations are included in the trending process in the same manner as is being done for similar findings produced by the self-initiated evaluation. Also, the staff determined that the process provides for tracking each issue individually from identification to final resolution.

The staff reviewed the initiatives or review techniques used in the DSAPs and determined that they sufficiently cover investigative and resolution techniques for evaluating the issues. In addition, the six-step methodology was evaluated against the above guidelines during the staff's review of the action plans addressing external source issues and it was found that this methodology has been properly applied. Also, the staff determined that the selection of the initiatives (guideline 6) in each of the DSAPs has been properly executed, even though the process governing this selection is not described in the Program Plan. In view of the fact that the staff specifically evaluated the selection of initiatives or review techniques for each of the DSAPs thus far available and will evaluate the selection of initiatives or review techniques for any future DSAPs during the implementation phase of the program, the staff concludes there is no need to describe the process governing this selection in the Program Plan.

Based on its evaluation described above, the staff determined that the six-step methodology satisfies the above guidelines and is an acceptable approach, if properly implemented, to identify and resolve issues.

During the design of CPSES, design concerns and issues raised by external sources have been identified, investigated, resolved, and closed by the applicant or third parties. These closed external source issues are to be reviewed by the CPRT as indicated on page 6 of Section II of the Program Plan. The CPRT will review closed ESIs for consistency with current knowledge and adequacy of resolution. The CPRT will include each closed issue in the process used for trending and generic implication evaluation. The staff reviewed this aspect of

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the DAP plan and acknowledges the CPRT commitment to review closed ESIs. The adequacy of such a process will be evaluated by the staff during implementation of the program.

3.5.2. Evaluation of Self-Initiated Design Program

The staff reviewed the CPRT's process for its self-initiated design evaluation. This review, which included documentation audits, examined the HDAs to develop an understanding of the CPRT's self-initiated evaluation and to ensure that an auditable trail existed. Also, the staff audited design verification checklists to ascertain completeness and readiness for commencing the implementation phase of the DAP. Although the adequacy of the checklists is not the staff's prerequisite for approval of the CPRT's process for DAP, it provided the staff with significant insight relative to the adequacy of the structure of the HDAs and a better overall perspective of DAP. The results of the design verification checklist audit are presented in the NRC Office of Inspection and Enforcement (IE) Inspection Report Nos. 50-445/85-17 and 50-446/85-14.

The staff's evaluation of the CPRT process for the self-initiated design evaluation and its documentation concentrated on the following key program elements:

- o BOP design scope
- o initial scope development
- o homogeneity of design activities
- o "givens"
- o validation of HDAs
- o design verification checklists
- o scope expansion
- o extrapolation of results

BOP Design Scope. The design of a nuclear power plant requires the involvement of several organizations. For the purpose of this evaluation, the staff has defined these organizations as follows: (1) A/E firms responsible for BOP design, (2) proven vendors (e.g., Westinghouse) that have provided equipment such as the NSSS over a number of years to many plants, and (3) unique vendors that have limited design experience in the nuclear field and may have supplied hardware only to CPSES. The DAP envelops the design performed by A/E firms and unique vendors and the design interfaces between A/E firms and proven and unique vendors. However, it excludes the review of the design of proven vendors because the CPRT claims that its equipment has sufficient operating history at other nuclear power plants and is to be considered free of any design defects.

The staff agrees with the CPRT's basis for excluding from the DAP the design activities of Westinghouse and other proven vendors. However, the CPRT's Program Plan does not state whether these vendors also have BOP design responsibilities which are specific to CPSES. Furthermore, the staff has not audited the CPRT's documentation files to confirm that the CPRT's basis for excluding the design activities of proven vendors from the DAP are substantiated, and that the design activities and interfaces of unique vendors are considered in the DAP. In addition, the process for identifying unique vendors has not

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been described in the Program Plan. The staff requires that CPRT makes available for audit the necessary information to resolve these concerns during the implementation of the DAP.

Initial Scope Development. In an earlier evaluation of Revision 2 of the CPRT Program Plan (submitted to the applicant by letter dated August 9, 1985), the staff advised the applicant that the proposed scope for the self-initiated design evaluation was too narrow. This letter provided the applicant with matrices intended to provide guidance concerning the breadth of a BOP design scope similar to that of CPSES for mechanical, electrical, and instrumentation and control disciplines. The applicant was asked to consider this guidance and to revise its scope accordingly.

The new proposed scope for the self-initiated design evaluation presented in Revision 3 of the CPRT Program Plan provides for a review of design inputs, analyses, and design output documents covering a wider range of design activities than existed in Revision 2 of the CPRT Program Plan. The staff reviewed the matrices defining the initial scope for the self-initiated design evaluation for the electrical, and instrumentation and control (DSAP XI), mechanical (DSAP X), and civil/structural (DSAP VIII) disciplines. The staff determined that the initial scope is adequate because it is enveloped by the matrices, is structured to represent HDAs, and can readily be expanded.

Homogeneity of Design Activities. The staff reviewed the process for identifying whether similarity existed among the occupants for each initial HDA with respect to the five attributes: criteria; design considerations, approach, and methodology; organization/discipline; design control process; and design interfaces. Also, the staff audited the information available to ascertain the adequacy of this process and determined that the occupants for each design activity could be grouped with respect to the attributes of homogeneity for criteria, organization/discipline, design control process, and design interfaces. The adequacy of the process for grouping occupants for each design activity in accordance with the attribute for design considerations, approach, and methodology could not be established because information was not available at that time. The staff does not consider the initial design activities to be reasonably homogeneous until the similarity of the occupants within each design activity are verified with respect to this missing attribute. However, the staff acknowledges that this concern will be resolved by CPRT during the validation of the initial HDAs to be accomplished during implementation of the DAP. The staff will confirm this and report its findings.

"Givens." As discussed in Section 3.3 of this SSER, a "given" is defined by the CPRT to be any design activity, design criterion, or area of design that is considered correct and that will not be reviewed under DAP. The staff agrees with the general concept that design activities that are considered correct or have been demonstrated correct need not be reviewed by the CPRT. However, the staff will confirm during the implementation phase that the identified "givens" are in fact correct. The staff has already required that CPRT make available for audit, information substantiating the designation of design activities performed by proven vendor suppliers as "givens." This subject is discussed above under the heading "BOP Design Scope."

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During the design of the CPSES, design concerns and issues raised by external sources have been identified, investigated, and resolved by the applicant or by a third party. These are referred to in the CPRT Program Plan as closed ESIs. The CPRT Program Plan does not state whether some of these closed ESIs may be considered by the CPRT as "givens." Unless justified otherwise, the staff requires that these issues not be considered as "givens" and continue to be treated as detailed in Section 3.5.1 of this SSER.

Validation of HDAs. The staff reviewed the methodology to be used for confirming the validity of each HDA during the implementation phase of the DAP. Also, the staff audited the procedures and documentation being prepared to accomplish this task. Particularly, the staff examined the listing of occupants associated with HDAs for various disciplines. In addition, the staff reviewed the procedure to be used for scanning occupants to confirm homogeneity relative to criteria, design considerations, approach, and methodology within an HDA and for the selection of the most complex occupant for review in a given HDA.

The staff determined that the DAP process for validating HDAs is based totally on engineering judgment and there is insufficient detailed information available at this time to permit an independent evaluation of the thought process. Thus, the staff cannot determine the adequacy of such a process at this time and defers its determination until sufficient information becomes available for review during the implementation phase of the program. The staff will evaluate the adequacy of this process and report its findings.

Design Verification Checklists. The staff reviewed the information presented in the Program Plan describing the purpose of the design verification checklists, and audited the contents of the checklists being prepared for each discipline. The staff determined that the checklists will correlate design criteria with specific documents related to design activities, provide the technical basis for review and documentation of the review scope accompanied by references and findings, and provide for in-depth review of design activities. Thus, the staff finds the intended purpose of the checklists to be acceptable. However, the staff acknowledges that during the audit of the checklists, certain problems were found concerning the coverage of design activities and the amount of detail in certain review topic areas. The resolution of the identified problems is not a prerequisite for approval of the DAP; however, the staff will verify that these identified problems, as noted in the NRC Office of Inspection and Enforcement (IE) Inspection Report Nos. 50-445/85-17 and 50-446/85-14, are satisfactorily corrected during implementation of the DAP.

The CPRT Program Plan allows for specific detailed checklist reviews to be substituted with applicable results from the CPSES testing program. Insufficient information has been provided in the CPRT Program Plan to permit an independent evaluation of that process for allowing these substitutions. The staff is concerned about the ability of the DAP to extrapolate equipment test results to other design activities not selected for review. The staff will evaluate the acceptability of each substitution during the implementation phase of the program.

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Scope Expansion. The capability to expand the scope of the program is inherent in the DAP and it was demonstrated during the various phases of scope development which has the staff's concurrence, as discussed above under the heading "Initial Scope Development." However, the staff is concerned about the lack of specificity describing the process that governs review scope expansion based on findings from the evaluation of ESIs or the self-initiated evaluation. Also, the CPRT Program Plan does not describe how the ESIs will be assessed for root causes and generic implications and how the findings will be factored into the review scope of HDAs. The staff requires that the CPRT resolve the second concern before the completion of the implementation of the validation process for HDAs. The staff will make the resolution of this concern a prerequisite for approval of the process for validation of HDAs.

The adequacy of the process to be used for expanding the review scope based on findings from the evaluation of external source issues or the self-initiated evaluation will be evaluated by the staff during implementation of its design audit review program.

The staff requires that the CPRT make available for audit the necessary information to permit an independent evaluation of the resolution of these concerns to be accomplished during the implementation phase of the program.

Extrapolation of Results. In order to determine the ability of the DAP to extrapolate the review results to other designs and design activities and reach a conclusion regarding the adequacy of the CPSES design and design process, it is essential that the designs selected for review are reasonably homogeneous and bound in comprehensiveness and/or complexity to their counterparts contained within that design activity. The CPRT has committed to validate the initial HDAs during the implementation phase of the DAP. However, insufficient information has been made available to the staff to permit an independent evaluation of the process to establish the initial HDAs, as well as their validation. Therefore, the staff cannot make a determination at this time about the ability of the DAP to extrapolate results and defers its decision until the validation process for the HDAs is determined by the staff to accomplish its intended function. The staff will audit the validation process and report its findings during the implementation phase of the program.

Evaluation Summary. The staff found that the self-initiated design program is structured to address all existing issues and any future issues that may be identified from further evaluations. The staff found acceptable the process used to develop and complete the initial scope which is structured to represent design activities in accordance with their homogeneity. The staff considers the self-initiated design evaluation extensive in scope and agrees with the CPRT's basis for excluding proven vendors' design activities from the DAP. However, the staff requires that the final documentation in support of this decision, as well as a listing of all proven vendors involved with CPSES, be made available for audit during the implementation phase of the Program Plan. Also, the staff requires that the process for identifying unique vendors involved with CPSES, as well as their identification, be made available for audit during the implementation of the program.

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The staff determined that the process for identifying initial HDAs with respect to the five established attributes of homogeneity is acceptable except for the attribute addressing design considerations, approach, and methodology. The exception is noted because of lack of information. Thus, the staff could not confirm the initial design activities to be reasonably homogeneous with respect to this missing attribute. However, the staff believes that this concern can be readily resolved by CPRT as part of the validation of the HDAs when the required information would be available.

The process for validating HDAs is totally based on engineering judgment and the thought process is not sufficiently defined to permit an independent evaluation. Thus, the staff elected to defer its determination of the adequacy of this process until implementation of the program when all the required information would be available and the validation of HDAs can be verified based on the audit of actual design information.

The staff agrees with the general concept that design activities that are considered correct or have been shown to be correct need not be reviewed by the CPRT; these are referred to as "givens." As indicated before, the staff will audit the final documentation during the implementation of the program to determine whether the activities of proven vendors (such as Westinghouse) can be considered "givens." Also, the staff requires that closed ESIs not be considered as "givens" by the CPRT, unless they are properly justified.

The intended purpose of the design verification checklists is found acceptable by the staff. However, the staff is concerned about the ability of the DAP to extrapolate to other design activities when the results of the CPSES testing program are used as substitutes for specific detailed checklist reviews. The staff will evaluate each case as part of its design audit review program of DAP implementation and will assess the acceptability of such substitutions, if there are any.

The staff determined that the process that governs review scope expansion based on the findings from the evaluation of ESIs and self-initiated evaluation is not defined in the CPRT Program Plan. Also, the staff determined that the CPRT Program Plan does not describe how the ESIs will be assessed for root causes and generic implications and how the findings will be factored into the review scope of the HDAs. The staff requires that these two concerns be resolved during implementation of the program. Furthermore, the staff will make the resolution of the second concern a prerequisite for approval of the process for validation of HDAs. The resolution of these concerns must be coupled with the overall resolution for defining a process for determining root cause and generic implications which is discussed in Section 1.6 of this SSER. The staff will verify as part of its design audit review program that these two concerns have been satisfactorily resolved.

As indicated before, the staff's evaluation of the process for validating HDAs is deferred to the implementation phase of the program. Thus, the staff's evaluation of the ability of the DAP to extrapolate results also needs to be deferred because it is based entirely on the adequacy of the process for establishing reasonable HDAs.

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The staff developed the aforementioned concerns during technical audits and discussed them with the CPRT and applicant at public meetings. Initially, the staff requested that the CPRT make every effort to resolve these concerns at the program level. As the review of the Program Plan progressed, the staff acquired a better understanding of the self-initiated design evaluation and determined that the staff's earlier requests may have been impractical because certain aspects of the validation processes are based on engineering judgment. The staff determined that the adequacy of those processes relying principally on engineering judgment can be evaluated most effectively during the implementation phase of the program, using the actual verification of design information to establish the required confidence in the processes employed.

3.5.3 Evaluation of Cable Tray/Conduit Support and Piping and Pipe Support Design Verification

Cable Tray/Conduit Support Design Verification. The staff's evaluation of the design verification effort for cable tray supports, conduit supports, and piping and pipe supports is based on review of the Program Plan, discussions at public meetings, and technical audits.

The staff has reviewed and evaluated the CPRT Program Plan associated with the design verification of cable tray and conduit supports. The staff determined that the scope of the CPRT's Program Plan is acceptable because it specifies 100 percent reevaluation for all cable tray supports in Units 1 and 2 and all conduit supports in Unit 2 and an evaluation of a sample of Unit 1 and common conduit supports selected in accordance with Appendix D of the CPRT Program Plan (evaluation and acceptance of the sampling process is discussed in Sections 2.3 and 2.4.3 of this SSER).

The staff considers the depth of the evaluation described in the CPRT Program Plan adequate because it provides for verification of design drawings, design review and analysis, assessment against acceptance criteria which complies with CPSES licensing commitments, testing, hardware modification (where required), and third-party oversight. The staff evaluated the comprehensiveness of the overall action plans for addressing the many design-related external source issues related to cable tray and conduit supports. Verification of the depth of the review and acceptability of the technical details which are provided in CPSES procedures and design criteria will be evaluated as part of the staff audit during implementation of the program. Furthermore, the staff evaluated the CPRT's structure and process for performing cable tray and conduit support design evaluations and considers the process adequate because the CPRT's Program Plan provides assurance that as-built verified configurations will be evaluated for compliance with licensing commitments. Furthermore, the program provides for testing to characterize cable tray and conduit structural response, determine damping factors, and confirm analytical methods and assumptions for use in the design evaluations. Finally, the staff determined that the CPRT is committed to providing third-party oversight of this effort. The staff considers verification of cable tray and conduit support evaluation appropriate and consistent with the CPRT Program Plan. The staff will audit the design verification, including the sampling process, during the implementation of the program.

In summary, the staff considers the scope, process, and structure for the CPRT's program for evaluating the design adequacy of cable tray and conduit

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supports to be acceptable based on its review of the program. Audits during the implementation phase will verify that the program has accomplished its objectives.

Piping and Pipe Support Design Verification. The staff has reviewed and evaluated details of the CPRT Program Plan associated with the requalification of piping and pipe supports. The scope and elements of this requalification program are described in Section 3.4.3 of this SSER.

The staff review focused on the comprehensiveness of the overall action plans to provide an adequate framework to address the many external source issues raised in the piping and pipe support design area. The completeness and acceptability of the technical details which are provided in CPSES procedures and design criteria will be reviewed as part of the staff evaluation of the implementation of the CPRT Program Plan.

The staff finds the scope of the piping and pipe support reanalysis program to be well defined and inclusive to address the range of technical issues raised by external sources. The action plans contain design, analysis, and verification elements necessary to ensure that the piping and pipe support requalification effort will be accomplished in a thorough and comprehensive manner. In addition, during the staff's technical audits of the piping and pipe support reanalysis effort, it was determined that the special technical issues resolution program described in the action plan will be accomplished by a separate technical group which is not directly involved with the piping and pipe support redesign effort to ensure an independent and uniform resolution of these complex issues. The staff finds that the program elements will be performed in accordance with approved procedures to ensure an auditable and well-documented process. In addition, the staff finds that the third-party overview by TERA of the piping and pipe support requalification will provide assurance that all applicable ESIs have been adequately addressed and resolved and that CPSES licensing commitments have been satisfied.

Based on the staff review of the CPRT Program Plan and on technical audits of the program scope, the staff finds the scope and process for the piping and pipe support requalification to provide an adequate framework to address the ESIs raised in the piping and pipe support discipline. The effectiveness in accomplishing its objective and the completeness of the program details will be reviewed by the staff through technical audits performed during the implementation of the program.

3.5.4 Overall Assessment of DAP

The staff has determined that the CPRT Program Plan presents an acceptable approach (1) for identifying and resolving ESIs and (2) for the design verification of piping and pipe supports, and cable tray/conduit supports. The staff also found that the self-initiated design program is structured to address all current and any future ESIs delegated to this program and any future issues that may be identified from implementation, and found acceptable the process used for developing and completing the initial scope which is structured to represent HDAs. Also, the staff has reconsidered its initial decision requesting that the adequacy of the validation processes in the self-initiated design program involving engineering judgment decisions be demonstrated at the program

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level. Instead, the staff has elected to defer this decision to the implementation phase of the program because confidence in these processes can be demonstrated better based on the actual verification of design information.

The staff will need more information about the integration of all three components of DAP (see Section 3.0 of this SSER) in order that an overall perspective is developed about the comprehensiveness of the scope to permit an assessment of the extrapolation to all the CPSES designs and design processes, based on the findings and resolutions related to items of design reviewed. Therefore, the staff requires that the applicant prepare a matrix that correlates the number of times that a design criterion attribute has been reviewed to the associated discipline HDAs. This must consider all design criterion attributes related to all open and closed external source issues and self-initiated evaluation. The matrix must be updated on a continuing basis. The staff will evaluate this information during the implementation phase of the program and will report its findings.

3.6 Conclusion

Based on the foregoing evaluation, the staff concludes that the Design Adequacy Program provides an acceptable process for resolving all current and any future external source issues related to design.

With regard to the self-initiated design program, the staff concludes that this program provides an overall structure for addressing all current and any future external source issues delegated to this program and any future issues which may be identified from implementation. Also, the staff concludes that this program documents an acceptable process for developing and completing the initial scope which is structured to represent homogeneous design activities. The process for identifying initial HDAs with respect to the design considerations, approach, and methodology attribute of homogeneity, and the process for validating HDAs involve numerous decisions based on engineering judgment; and the adequacy of these processes will be demonstrated during the implementation phase of the CPRT Program Plan using the actual verification of design information to establish the required confidence in the processes employed. The adequacy of these processes will be assessed by the staff during implementation of its design audit review program.

For the piping, pipe support, cable tray, and conduit support programs, the staff concludes that the CPRT Program Plan provides an adequate framework and process for performing the design verification tasks. The effectiveness of the program, the completeness of the details, and the quality of the results will be reviewed during implementation of the program to ensure that the objectives of the scope have been met.

The staff will evaluate the resolution of all other matters identified in its evaluation as part of its design audit review program to be executed during the implementation of the CPRT Program Plan.

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4.0 CPRT QUALITY ASSURANCE PROGRAM

4.1 Introduction

The Comanche Peak Response Team (CPRT) quality assurance (QA) program is described in the CPRT Program Plan. The objective of the CPRT QA program is to ensure the quality of CPRT Program Plan activities and results. The CPRT Senior Review Team (SRT) directed that the QA program be developed based on appropriate criteria in 10 CFR 50, Appendix B.

The CPRT QA program is structured to govern three categories of CPRT activities:

- Technical Review Team (TRT) Issue-Specific Action Plans (ISAPs) that address concerns in the areas of electrical, quality control (QC) inspector qualification, civil, structural, testing programs, mechanical, and miscellaneous (ISAP series I through VI). The program established to govern this activity is referred to as the TRT ISAP QA program in the ensuing discussion.

- Those quality of construction (QOC) program ISAPs that address QA/QC concerns raised by the TRT and other external sources, as well as the CPRT self-initiated actions related to Comanche Peak Steam Electric Station (CPSES) quality of construction (ISAP series VII). The program established to govern this activity is referred to as the QOC QA program in the ensuing discussion.

- Design Adequacy Program (DAP) Discipline-Specific Action Plans (DSAPs) that address design concerns raised by external sources and that include the CPRT self-initiated actions related to CPSES design adequacy (DSAP series VIII through XI). The program established to govern this activity is referred as the DAP QA program in the ensuing discussion.

To support the SRT in fulfilling its responsibilities, an Overview Quality Team (OQT) is established to ensure that the QOC QA and DAP QA programs are being effectively implemented.

The OQT supports the SRT and supplements CPRT QA activities by reviewing the results of all audits of CPRT activities, as well as the corrective actions taken in response to those audits. Such audits include all planned and periodic audits conducted by the organizations managing the QOC QA and DAP QA programs, as well as any audits of CPRT activities conducted by the NRC and Texas Utility Generating Company (TUGCO). The OQT may also conduct special audits, as directed by the SRT Chairman.

4.2 Staff Evaluation

The staff's evaluation of the CPRT QA program is based on a review of the QA program description to determine that: (1) it provides a means to control the quality-related activities of the CPRT Program Plan, and (2) it meets the

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appropriate provisions of 10 CFR 50, Appendix B. Based on the scope of the CPRT Program Plan discussed in previous sections of this SSER, the staff has determined that the criteria in 10 CFR 50, Appendix B, that the CPRT QA program should address are:

Criterion 1, Organization
Criterion 2, QA program
Criterion 3, Design control
Criterion 4, Procurement document control
Criterion 5, Instructions, procedures, and drawings
Criterion 6, Document control
Criterion 7, Control of purchased material, equipment, and services*
Criterion 10, Inspection
Criterion 12, Control of measuring and test equipment
Criterion 15, Nonconforming materials, parts, or components
Criterion 16, Corrective action
Criterion 17, QA records
Criterion 18, Audits

Conversely, the staff has determined that the CPRT QA program should not address the following criteria:

Criterion 8, Identification and control of material, parts, and components
Criterion 9, Control of special processes
Criterion 11, Test control
Criterion 13, Handling, storage, and shipping
Criterion 14, Inspection, test, and operating status

These criteria are not applicable to the CPRT program since these provisions of 10 CFR 50, Appendix B, apply to activities which the CPRT is not responsible for and/or does not intend to perform.

The staff has evaluated the CPRT QA program described in the CPRT Program Plan to determine the QA program's acceptability based on the above-listed provisions of 10 CFR, Appendix B. The result of the staff's evaluation is discussed below.

o Criterion 1, Organization. The staff finds the CPRT organization acceptable based on the following organization and responsibilities described in the CPRT Program Plan. The CPRT organization for QA is shown in Figure 4.1 of this SSER. The CPRT responsibility for the quality of CPRT activities rests with the SRT which consists of the Vice President of TUGCO, the Vice President of International Technology Corporation (consultant), the Vice President of Management Analysis Company (consultant), the Manager of Nuclear Safety and Licensing, TERA Corporation (consultant), the President of Nyer Incorporated (consultant), and Dr. John H. Buck, consultant.

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*That portion of Criterion 7 relating to control of purchased material and equipment is not applicable to the CPRT, since the CPRT does not intend to perform this activity.

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The SRT responsibilities are to:

- Develop and maintain the CPRT Program Plan
- establish standards for personnel qualification and objectivity
- select and assign Review Team Leaders (RTLs) who will report to the SRT
- review and approve action plans and their revisions
- review and approve determinations of safety significance, root causes, and generic implications
- monitor the status of CPRT Program Plan implementation
- review and approve reports of action plan results
- review and approve collective significance evaluation reports
- receive the results of all audits of CPRT activities
- receive corrective action response to audit findings
- perform, or have performed for them, audits to directly evaluate CPRT QA activities

The SRT fulfillment of these responsibilities provides the management overview of the TRT ISAP QA program to verify proper implementation.

The Evaluation Research Corporation (ERC) under the direction of the QA/QC RTL is responsible for managing and directing the implementation of the QOC. Reporting to this RTL is the Supervisor of Procedures and Project Assurance. The Supervisor of Procedures and Project Assurance also reports to the ERC Division Manager of Quality Assurance since this supervisor is the onsite representative of the ERC Manager of Quality Assurance. The responsibilities of the Supervisor of Procedures and Project Assurance include surveying and auditing of QOC activities and reporting the status of the QA program to the QA/QC RTL and the ERC Manager of Quality Assurance. The ERC Manager of Quality Assurance has the authority to issue corrective action requests or stop-work orders for ERC activities should major problems arise.

TERA Corporation, under the direction of the DAP RTL, is responsible for managing and directing the implementation of the DAP. Reporting to the DAP RTL is the DAP-QA Manager who is responsible for developing the QA program and ensuring its proper implementation throughout the DAP activities. This responsibility includes the review and concurrence of procedures, purchase orders, and corrective actions and conducting audits of DAP activities to verify proper implementation of the QA program.

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The organizations responsible for ensuring that the CPRT QA program controls are effectively executed have the authority and organizational freedom to identify quality problems and ensure that corrective actions are identified and properly carried out. Since these organizations are independent of the pressure of cost and schedules because they do not report to the line management directly responsible for the work, the organizational structure is acceptable.

- Criterion 2, QA Program. The staff finds that CPRT Program Plan meets the requirements of this criterion by establishing a QA program for CPRT activities in accordance with the elements in Criterion 2. QA activities are required to be carried out using documented, controlled procedures. Technical and QA personnel involved in implementing and verifying, respectively, the CPRT Program Plan are required to be qualified in the areas of their assigned responsibilities and are to be trained as necessary on the provisions of that plan. The SRT is required to regularly review the status and adequacy of the CPRT program through the review and approval of action plan results, the review of audit results identified by internal audits and by outside agencies, and the review of corrective actions resulting from audit findings.

- Criterion 3, Design Control. The staff finds that the CPRT design controls are acceptable based on the following measures described in the CPRT Program Plan. Design verifications are required to be performed in accordance with written procedures by qualified, trained personnel other than those who performed the original design. The verification activities include the preparation of checklists and criteria lists, calculation review, input review, alternate calculations, and review of quality and QA requirements. Furthermore, design activities are required to be controlled in accordance with the design controls described in ANSI N45.2.11, "QA Requirements for the Design of Nuclear Power Plants," which is a consensus industry standard.

- Criterion 4, Procurement Document Control. The staff finds that the CPRT procurement document controls are acceptable based on the following measures described in the CPRT Program Plan. Procurement documents for services relating to CPRT activities are required to include appropriate QA requirements and to be reviewed by either the QA manager responsible for QOC or DAP.

- Criterion 5, Instructions, Procedures, and Drawings. The staff finds that the CPRT use of instructions, procedures, and drawings is acceptable based on the following measures described in the CPRT Program Plan. Procedures or checklists are required to be used in the performance of CPRT activities such as inspections and record reviews. The CPRT Program Plan includes the format and procedures for preparing specific action plans and results reports. Acceptance criteria are included in the specific action plans. In addition, implementing procedures and instructions have been established and are included or referenced in the CPRT Program Plan.

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- Criterion 6, Document Control. The staff finds that the CPRT program for document control is acceptable based on the following measures described in the CPRT Program Plan. Procedures to control the review, approval, and issuance of documents are required. These procedures require that the SRT review and approve action plans and revisions to action plans, corrective action recommended by RTLs, action plan result reports, and corrective evaluation reports. Personnel performing CPRT activities are required to use the latest revision of documents. Changes to CPRT documents are required to receive the same level of review as the originals.

- Criterion 7, Control of Purchased Services. The staff finds that the CPRT program for the control of purchased services is acceptable based on the following measures described in the CPRT Program Plan. Procurement of services by DAP participants will require that the procured services be performed under the total requirements of the CPRT QA program. Procurement of services by QOC are required to be made only from organizations on ERC's Approved Source List. An ERC procedure requires that preaward surveys be conducted and that personnel qualifications be reviewed.

- Criterion 10, Inspection. The staff finds that the CPRT controls of the CPRT inspections are acceptable based on the following measures described in the CPRT Program Plan. The inspection system is required to be defined by procedures and instructions. Inspectors must be provided the necessary drawings, inspection instructions, accept/reject criteria, checklists, and forms for documenting the inspection. An ERC procedure requires the use of calibrated inspection equipment, which is supplied by the CPSES project.

  Furthermore, CPRT inspectors are required to be qualified in accordance with ANSI N45.2.6, "Qualification of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants," which is a consensus industry standard.

- Criterion 12, Control of Measuring and Test Equipment. Although the CPRT Program Plan does not specifically address the control of measuring and test equipment, discussions with Region IV personnel show that measuring and test equipment used by QOC personnel is under the control and calibration program of the CPSES QA program. The CPRT Program Plan indicates that a procedure addresses requirements for using calibrated inspection equipment. Therefore, the staff finds that the CPRT control for measuring and test equipment is acceptable.

- Criterion 15, Nonconforming Materials, Parts, or Components. The staff finds that the CPRT controls for nonconformances are acceptable based on the following measures described in the CPRT Program Plan. Nonconformances such as deviations and deficiencies that are identified during the conduct of CPRT activities are required to be documented, evaluated, classified, and trended by the CPRT.

- Criterion 16, Corrective Action. The staff finds that the CPRT controls for corrective action are acceptable based on the following measures described in the CPRT Program Plan. The CPSES project is responsible for evaluating, determining, and implementing the corrective action of

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nonconformances identified by the CPRT and for performing the 10 CFR 50.55(e) reportability studies. All actions for which the CPSES project is responsible are carried out under the CPSES QA program.

The CPRT may recommend proposed corrective actions to the CPSES project with approval by the SRT. The CPRT RTLs are responsible for determining the adequacy of the corrective actions defined by the CPSES project. The CPRT must satisfy itself that corrective actions at CPSES will correct the specific nonconforming conditions identified by the CPRT and, if applicable, will preclude the recurrence of similar nonconforming conditions in the future. The CPRT RTLs are required to perform documented confirmatory overviews of the implementation of selected corrective actions.

- Criterion 17, QA Records. The staff finds that the CPRT controls for QA records are acceptable based on the following measures described in the CPRT Program Plan. QA records such as action plan working files, results of analyses, SRT meeting minutes, result reports, and personnel qualifications generated as a result of the CPRT Program Plan are required to be maintained at the CPRT central file by the CPRT Program Director.

- Criterion 18, Audits. The staff finds that the CPRT controls for audits of QOC and DAP are acceptable based on the following measures described in the CPRT Program Plan. Audits are required to be performed to verify compliance with the implementation of the CPRT's QOC and DAP. Personnel performing the audits must be qualified and must not have direct responsibilities in the areas being audited. Checklists are required to be used in conducting the audits, and audit results must be documented and reported to the management having responsibility for the audited areas. Followup reviews are required to be made to ensure the proper resolution of identified open items. The Overview Quality Team will support the SRT by reviewing the results and corrective actions associated with audits performed under the DAP and QOC QA program and those performed by NRC. In lieu of a formal documented audit program, the TRT ISAP program provides an overview of activities and documents through (1) checks of activities by the RTLs to ensure that action plans within their areas of responsibility are being properly implemented, (2) review, verification, and approval of the results of implementing the ISAPs by the CPRT results report and File Review Committee, and (3) review and approval of results reports by the SRT. The staff finds that this overview of the TRT ISAP program lacks the detailed audit approach (scope, schedule, corrective action) normally found in QA programs. In this regard, the staff requires that an audit program be established and implemented by the SRT for the TRT ISAP program. The staff will review this matter periodically during the implementation phase of the program.

The CPRT Program Plan does not specifically address that portion of Criterion 7 relating to control of purchased equipment and material; nor does it specifically address

Criterion 8, Identification and control of material, parts, and components
Criterion 9, Control of special processes
Criterion 11, Test control

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Criterion 12, Control of measuring and test equipment
Criterion 13, Handling, storage, and shipping
Criterion 14, Inspection, test, and operating status

This is acceptable to the staff, with the exception of Criterion 12, since these provisions are not applicable to CPRT activities. However, if activities that normally come under the control of these provisions are initiated by the CPRT, there is a commitment in the CPRT Program Plan that these provisions will be incorporated as appropriate. The NRC staff will review and inspect these activities if initiated during the implementation phase of the CPRT Program Plan. QOC control of measuring and test equipment is discussed under Criterion 12 above.

4.3 Conclusion

The CPRT QA program associated with implementing the CPRT Program Plan describes adequate QA controls and QA organizational responsibilities. The organizations and persons performing QA functions have sufficiently defined responsibilities and authority to carry out the elements of the QA program. The QA program describes requirements, procedures, and controls that, when properly implemented, meet the appropriate provisions of Appendix B to 10 CFR 50, except as noted above in the area of auditing of the TRT ISAP program.

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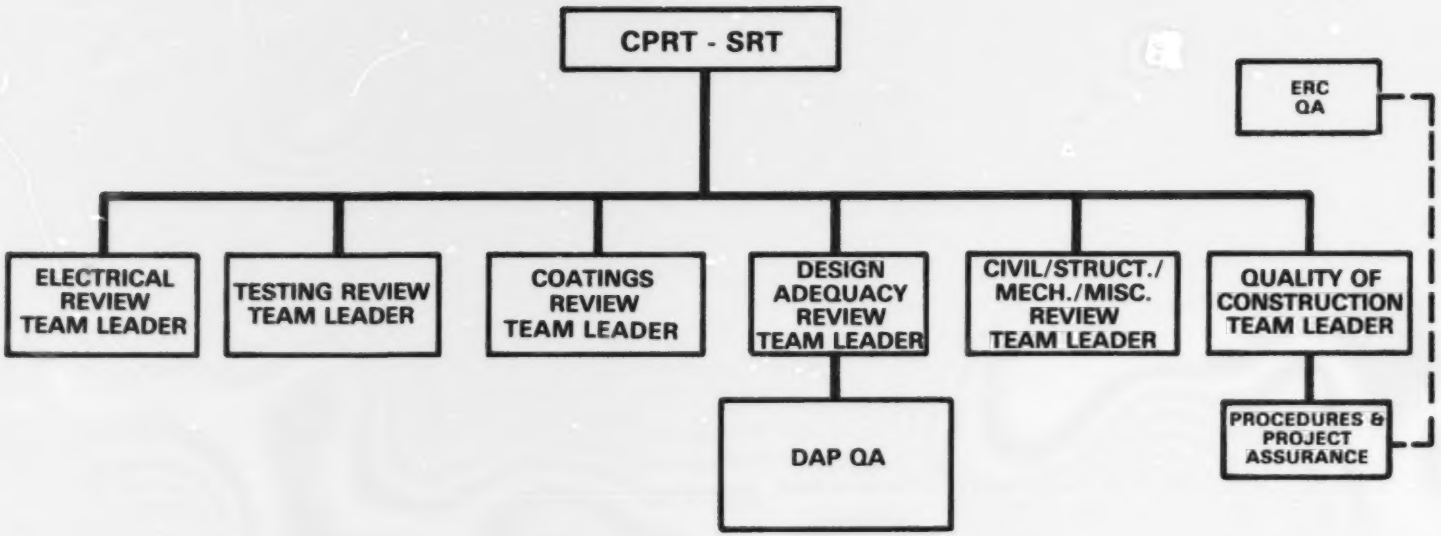

Figure 4.1 CPRT organization for quality assurance

5.0 CONCLUSION

The staff evaluated the Comanche Peak Response Team (CPRT) Program Plan and finds that it provides an overall structure for addressing all existing construction and design issues and any future such issues that may be identified from further evaluations. The staff concludes that the construction and design adequacy programs provide an acceptable process for resolving all current and any future external source issues.

The Program Plan also contains the applicant's commitment to a set of self-initiated programs intended to complement other programs in assessing the adequacy of design and construction at the Comanche Peak Steam Electric Station (CPSES). The staff's evaluation of the Program Plan included audits of the self-initiated programs on design and construction adequacy. The staff finds these self-initiated programs to be appropriate mechanisms for providing important evidence about design and construction quality, if properly implemented. The staff concludes that the self-initiated construction program documents an acceptable process for providing important evidence concerning quality of construction.

With regard to the self-initiated design program, the staff concludes that this program provides an acceptable process for developing and bringing to completion the initial scope which is structured to represent homogeneous design activities (HDAs). Certain aspects of the process for identifying HDAs and the process for validating HDAs involve numerous decisions based on engineering judgment; the adequacy of these processes will be assessed by the staff during implementation of its design audit review program to be executed during the implementation phase of the CPRT Program Plan.

The CPRT's sampling inspections are intended to ensure that a systematic approach is used in the resolution of some specific issues and in the execution of the self-initiated construction evaluation. The staff concludes that the methodology of the sampling process is acceptable. The staff will continue to audit specific application of sampling during the implementation of the Program Plan. The staff notes that some areas have already been identified for 100 percent reevaluation (e.g., piping and pipe supports and cable tray and conduit supports).

The staff evaluated the quality assurance (QA) program for implementing the CPRT Program Plan and concludes that it adequately describes the QA controls and QA organizational responsibilities. Additionally, the staff's evaluation finds the issue-specific and discipline-specific action plans responsive to external source issues identified at this time. The staff will evaluate the resolution of all matters identified in SSER 13 during the implementation phase of the CPRT Program Plan.

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APPENDIX A

IDENTIFICATION OF ALL COMPONENTS OF THE CPRT PROGRAM PLAN, INCLUDING APPENDICES, ISAPs, AND DSAPs BY REVISION NUMBER

Although reference is made in this evaluation to "Revision 3" of the CPRT Program Plan, the document actually consists of numerous documents, each of which has its own revision number. In addition, "Revision 3" is considered to include four additional letters received after Revision 3 was issued on January 27, 1986. Therefore, for purposes of this assessment, Revision 3 is considered to consist of the basic Revision 3 submittal of January 27, 1986, plus the following:

(1) Appendix D, "CPRT Sampling Approach", submitted on January 31, 1986

(2) Appendix E, "CPRT Procedure for Classification, Evaluation, and Tracking of Specified Design or Construction Discrepancies Identified by the CPRT," submitted on February 7, 1986

(3) The Testing Issue-Specific Action Plans (ISAPs), submitted on February 28, 1986*

(4) Appendix G, "Overview Quality Team," submitted on February 28, 1986

Identified below is the revision number for each component of Revision 3 of the CPRT Program Plan as of the date of this evaluation.

COMPONENT	COMPONENT TITLE	REVISION NO.
Program Plan	CPRT Program Plan	3
APPENDIX A	DESIGN ADEQUACY PROGRAM PLAN	1
APPENDIX B	QUALITY OF CONSTRUCTION AND QA/QC ADEQUACY PROGRAM PLAN	3
APPENDIX C	ACTION PLANS	
Electrical ISAPs		
I.a.1	Heat-Shrinkable Cable Insulation Sleeves	4
I.a.2	Inspection Reports on Butt-Splices	4
I.a.3	Butt-Splice Qualification	4
I.a.4	Agreement Between Drawings and Field Terminations	4
I.a.5	NCRs on Vendor Installed Amp Terminal Lugs	4
I.b.1	Flexible Conduit to Flexible Conduit Separation	4
I.b.2	Flexible Conduit to Cable Separation	4
I.b.3	Conduit to Cable Tray Separation	4
I.b.4	Barrier Removal	4

* ISAP III.a.1 was not included.

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COMPONENT	COMPONENT TITLE	REVISION NO.
Civil/Structural ISAPs		
I.c	Electrical Conduit Supports	3
II.a	Reinforcing Steel in the Reactor Cavity	3
II.b	Concrete Compression Strength	3
II.c	Maintenance of Air Gap Between ConcreteStructures	3
II.d	Seismic Design of Control Room Ceiling Elements	3
II.e	Rebar in the Fuel Handling Building	3
Testing ISAPs		
III.a.1	Hot Functional Testing (HFT) Data Packages*	-
III.a.2	JTG Approval of Test Data	3
III.a.3	Technical Specification for Deferred Tests	3
III.a.4	Traceability of Test Equipment	4
III.b	Conduct of the CILRT	4
III.c	Prerequisite Testing	4
III.d	Preoperational Testing	4
IV.	Reserved for Protective Coatings**	
Mechanical ISAPs		
V.a	Inspection for Certain Types of Skewed Welds in NF Supports	2
V.b	Improper Shortening of Anchor Bolts in Steam Generator Upper Lateral Supports	2
V.c	Design Consideration for Piping Systems Between Seismic Category I and Non-Seismic Category I Buildings	2
V.d	Plug Welds	2
V.e	Installation of Main Steam Pipes	2
VI.a	Gap Between Reactor Pressure Vessel Reflective Insulation and the Biological Shield Wall	2
VI.b	Polar Crane Shimming	2

* ISAP III.a.1 was not included

** SSER 9 declassified protective coatings and negated the need for a protective coatings ISAP. Paint quality concerns are being addressed under the QOC program.

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COMPONENT	COMPONENT TITLE	REVISION NO.
QA/QC ISAPs		
I.d.1	QC Inspector Qualifications	2
I.d.2	Guidelines for Administration of QC Inspector Test	2
I.d.3	Craft Personnel Training	C
VII.a.1	Material Traceability	1
VII.a.2	Non-Conformance and Corrective Action System	1
VII.a.3	Document Control	1
VII.a.4	Audit Program and Auditor Qualification	1
VII.a.5	Periodic Review of QA Program	1
VII.a.6	Exit Interviews	1
VII.a.7	Housekeeping and System Cleanliness	1
VII.a.8	Fuel Pool Liner Documentation	1
VII.b.1	On-Site Fabrication	1
VII.b.2	Valve Disassembly	1
VII.b.3	Pipe Support Inspections	1
VII.b.4	Hilti Anchor Bolt Installation	1
VII.b.5	DELETED	
VII.c	Construction Reinspection/Documentation Review Plan	1
DSAPs		
VIII	Civil/Structural Discipline Specific Action Plan	1
IX	Piping and Support Discipline Specific Action Plan	1
X	Mechanical Systems and Components Discipline Specific Action Plan	1
XI	Electrical/I&C Systems and Components Discipline Specific Action Plan	1
APPENDIX D	CPRT SAMPLING APPROACH	1
APPENDIX E	CPRT PROCEDURE FOR CLASSIFICATION, EVALUATION, AND TRACKING OF SPECIFIED DESIGN OR CONSTRUCTION DISCREPANCIES IDENTIFIED BY THE CPRT	1
APPENDIX F	CPRT INTERFACES	1
APPENDIX G	OVERVIEW QUALITY TEAM	0
Attachment 1	CPRT Third-Party Quality Assurance Program	0
Attachment 2	Management Program Plan for the QA/QC Review Team	4
Attachment 3	Design Adequacy Review Team Quality Assurance Program	0
Attachment 4	Verification of Issue-Specific Action Plan Working Files	0
APPENDIX H	CPRT PROCEDURE FOR THE DEVELOPMENT, APPROVAL, AND CONFIRMATION OF IMPLEMENTATION OF CORRECTIVE ACTIONS	0

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APPENDIX B

ITEMS REQUIRED TO BE ADDRESSED BY APPLICANT DURING THE IMPLEMENTATION PHASE CONCERNING CONSTRUCTION ADEQUACY AND ISAPs

This appendix presents the NRC staff's general comments concerning matters related to the Construction Adequacy Program and specific comments related to certain ISAPs. These should be addressed by applicant during the implementation phase of each ISAP. The NRC staff has no comments on the remaining ISAPs which are considered to be responsive to external source issues identified at this time.

The NRC staff will examine the applicant's responses to these comments as part of its inspection program for the CPRT Program Plan implementation of all ISAPs.

B.1 GENERAL COMMENTS

Staff comments identified in the body of the SSER follow:

(1) Loss of margin should be addressed in safety significance evaluations (p. 1-6).

(2) The root cause determination process lacks detail (p. 1-7).

(3) The CPRT description for determining generic implications lacks specificity (p. 1-8).

(4) Homogeneity of construction-related populations will be investigated further as part of the root-cause determination of identified problems (p. 2-7).

(5) Process for stratification of a population into a newly defined stratum is to be evaluated further in individual results reports (p. 2-7).

(6) If factors affecting initial homogeneous populations are found during sampling, the original population should be restructured to account for the newly identified factors affecting the attribute (p. 2-10).

(7) The matrix described in Section 2.1 should be supplemented to correlate attributes inspected to the associated hardware populations (p. 2-10).

(8) An audit program should be established for the TRT ISAP program (p. 4-6).

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B.2 TESTING ISSUES

ISAP III.a.1 - Hot Functional Testing

Staff Comments

The applicant has not provided Revision 4 of this ISAP.

B.3 MECHANICAL AND PIPING ISSUES

ISAP V.a - Inspection of Certain Types of Skewed Welds in NF Supports

This ISAP addresses actions required by SSER 10, Mechanical and Piping Category 3, allegation AQW-73, concerning the failure of TUEC to provide documentation that certain types of skewed fillet welds were reinspected correctly (welds that exhibited a skewed condition; i.e., interfaces of curved sections).

Staff Comments

The staff conducted an evaluation of the CPRT Program Plan for ISAP V.a and found the action plan to be responsive to the issues raised since the plan addressed inspection methods, procedure revisions, and reinspections. The staff, however, requires assurance that the root cause of the original TRT issue and its generic implications are properly addressed in the results report, independent of whether any safety-significant deficiencies are found. The staff has determined that the root cause and generic-implication aspect of this issue is to be considered as important, since the inspection techniques for skewed welds had been addressed previously by TUEC, thus suggesting potential generic implications.

In addition, the response by the CPRT to Item 1 of the staff letter of September 30, 1985, concerning ISAP V.a requires further explanation concerning the intent of procedure QI-QAP-11.1-28 with respect to the inspection of skewed welds.

ISAP V.d - Plug Welds

This ISAP addresses actions required by SSER 10, Mechanical and Piping Category 4, allegation AW-14, concerning incorrectly located bolt holes in baseplates, pipe supports, and cable tray supports that were "plug welded" without authorization, with undocumented weld filler metal and without quality control inspection.

Staff Comments

Based on the evaluation of ISAP V.d of the CPRT Program Plan, the staff concluded that the methodology of the ISAP was generally acceptable. However, the staff notes that the confidence level of the proposed sampling plan is less than that described in Appendix D of the Program Plan. The staff, therefore, is concerned that the activity described in paragraph 4.1.1.1 of ISAP V.d to improve the reliability of the detection of unauthorized plug welds may not be effective. Results of test inspections of painted mockup supports containing

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hidden plug welds show that an acceptable percentage of plug welds were unable to be detected; thus the confidence level of Appendix D may not be achievable. Accordingly, if required, TUEC should modify the sampling plan or perform a bounding analysis to provide assurance that the ability of the pipe supports, baseplates, and cable tray supports to perform their intended function has not been compromised.

ISAP V.e - Repositioning of the Main Steam Line

This ISAP addresses actions required by SSER 10, Mechanical and Piping Category 11, allegation AP-13, concerning the 32-inch main steam line that may have been forced into position by the polar crane and 3-ton come-alongs. Tension induced in the line as a result of movement during the alleged incident may still be present in the line.

Staff Comments

For the repositioning of the main steam line, the specific engineering evaluation and generic study described in this ISAP provides an acceptable basis for resolution of the issues and concerns resulting from the TRT investigations of allegations regarding forced movement of the main steam line and improper welding of temporary supports.

Although the CPRT has concluded that the sequence of events described in SSER 10 relating to main steam line incident is not correct, the root cause and generic implications of settlements of supports and stresses due to hydrostatic testing and flushing activities should be evaluated by TUEC, since a similar sequence of events could have occurred elsewhere.

B.4 QA/QC ISAPs

The CPRT Program Plan, Attachment 3, Issue Specific Action Plan Format, requires that the ISAPs contain descriptive information as outlined under topical headings in the format. The staff's evaluation found that although the plans contain sufficient descriptive methodology for their implementation, the following listed ISAPs have one or more deficiencies in the ISAP content required by the format.

Staff Comments

The following ISAPs should be revised to comply with the format requirements.

(1) ISAP I.d.3 - Craft Personnel Training

Section 4.4 does not identify existing procedures or describe any revised or new procedures.

(2) ISAP VII.a.3 - Document Control

Section 4.4 does not identify existing procedures or describe any revised or new procedures.

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(3) ISAP VII.a.4 - Audit Program and Auditor Qualifications

Section 4.4 does not identify existing procedures or describe any revised or new procedures.

(4) ISAP VII.a.5 - Periodic Peview of QA Program

Section 4.4 does not identify existing procedures or describe any revised or new procedures.

(5) ISAP VII.a.6 - Exit Interviews

Section 4.4 does not identify existing procedures or describe any revised or new procedures.

(6) ISAP VII.a.7 - Housekeeping and System Cleanliness

Section 4.4. contains a narrative regarding the retention of checklists, guidelines, etc., instead of referencing existing procedures or describing any revised or new procedures.

(7) ISAP VII.a.8 - Fuel Pool Liner Documentation

Section 4.4 contains a narrative regarding types of documents to be developed and their retention, instead of referencing existing documents and describing any revised or new procedures.

(8) ISAP VII.b.1 - Onsite Fabrication

Section 4.4 contains a narrative regarding types of documents to be developed and their retention, instead of referencing existing procedures and describing any revised or new procedures.

Section 4.6 contains a narrative regarding the basis for the criteria, instead of the identification of the codes and standards as required by the ISAP format.

(9) ISAP VII.b.4 - Hilti Anchor Bolt Inspections

Section 4.6 contains a narrative regarding the basis for the criteria, instead of the identification of the codes and standards as required by the ISAP format.

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APPENDIX C

ITEMS REQUIRED TO BE ADDRESSED BY APPLICANT DURING THE IMPLEMENTATION PHASE CONCERNING DESIGN ADEQUACY PROGRAM AND DISCIPLINE-SPECIFIC ACTION PLANS

This appendix presents the NRC staff's general comments concerning matters related to the design adequacy program (DAP) and specific comments related to the Discipline-Specific Action Plans (DSAPs). These should be addressed by the applicant during the implementation phase of each DSAP.

The NRC staff will examine the applicant's responses to these comments as part of its design audit review program for the CPRT Program Plan implementation of all DSAPS.

C.1 GENERAL COMMENTS

The first four comments below relate to certain issues of broad application to both DSAPs and ISAPs and provide the staff's comments on how these issues should be accommodated by the CPRT program.

(1) Safety-significant evaluations of discrepancies related to the self-initiated construction adequacy program are currently under way using information, in some cases, that is being revised by the CPSES project. (Two areas of major concern in the DAP are piping and pipe supports and cable tray/conduit supports.) Until this revised information becomes available as "plant record documentation," the safety-significance evaluation process cannot be completed. Any evaluations made using existing documentation must be revised when the new documentation becomes available. The major reason for this is that TUGCO has elected to perform extensive reanalysis of piping and pipe supports and cable tray/conduit supports which could result in hardware modifications related to design optimization or resolution of deficiencies, or different design documents and values that form the basis for the safety-significance evaluation. Therefore, new design documents and loads/stress values that form the basis for the safety-significance evaluations would be available. However, this does not preclude the fact that existing issues which led to the current reanalysis of piping and pipe supports and cable tray/conduit supports must be evaluated for root cause and generic implications to ensure that programmatic deficiencies do not extend beyond the boundaries covered by the reanalysis efforts.

Staff Comment

The staff requires that the CPRT establish procedural direction or instruction to ensure that safety-significant evaluation of discrepancies related to the self-initiated design or construction adequacy program and the potential for scope expansion is based on final plant documentation. However, this should not preclude the fact that existing issues must be evaluated for root cause and generic implications.

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(2) Safety-significant evaluations must be performed using Code or regulatory criteria. That is, the techniques used and the extent of the evaluation must address each criterion that formed the basis for the original design. This matter is not limited to design discrepancies but includes construction discrepancies for which safety significance is determined through the use of design evaluations.

Staff Comments

The CPRT must provide procedural direction or instruction to ensure that the techniques used and the extent of the evaluation address each criterion that formed the basis for the original design.

(3) There is a lack of discussion in the Program Plan on the approach to be used in root-cause and generic-implication determination. In order to understand any CPRT-proposed evaluation, the Program Plan needs to define the terms "root cause" and "generic implication." This is critical, since the depth and breadth of the root-cause evaluation will be a function of the CPRT understanding of these terms. The staff anticipates that the CPRT will consider the following, as a minimum, in determining the root cause of deficiencies: personnel, process, procedures, design (as it affects construction), materials, and management.

Staff Comment

The CPRT must define those terms or issue procedural direction/instruction to ensure that persons performing these evaluations have a common understanding of the factors that affect the determinations.

(4) For issues classified as deviations in ISAPs, QOC and DAP (discrepancies that do not meet licensing criteria), the corrective action will be either (a) modification to meet licensing criteria, (b) acceptance of the deviation through an appropriate nonconformance evaluation process, or (c) justified modification of the licensing criteria.

Staff Comment

Item (b) above must be supplemented to include a justification for not meeting the licensing criteria and the appropriate documents must be modified if modification is required. The FSAR must accurately describe the plant.

(5) Exclusion of proven vendors from DAP is described in Sections 3.0 and 3.5.2 of this SSER.

Staff Comment

The staff evaluation presented in Section 3.5.2 under the heading "BOP-Design Scope" is supplemented as indicated below. With respect to proven vendors, it appears that Westinghouse may have design responsibility which extends beyond the standard NSSS four-loop scope which is specific to CPSES as described below:

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- o Westinghouse maintains final design analysis (proof of design) responsibility for the safety-related residual heat removal (RHR) system and the chemical and volume control system (CVCS). This responsibility requires the utilization of plant-specific data such as pipe routing, pipe size, and equipment locations.

- o Westinghouse maintains design responsibility for the ASME Code Class 1 auxiliary piping attached to the reactor coolant system (RCS) main coolant loop which requires plant-specific piping configuration, pipe sizes, and support locations.

During the evaluation of design interfaces for excluded vendors, if inconsistencies are identified regarding vendor exclusions, the scope of these vendors' participation in the CPRT Program Plan should be reevaluated. As part of this evaluation, a determination will be made to include in the DAP those BOP-design activities performed by Westinghouse if they are considered to be specific to CPSES.

Other general comments identified in the body of SSER 13 are as follows:

(6) The attribute for design considerations, approach, and methodology related to the homogeneous design activities (HDAs) could not be established because of a lack of information (p. 3-12).

(7) The CPRT Program Plan does not state whether closed ESIs may be considered by the CPRT as "givens." Unless justified otherwise, the staff requires that these issues not be considered as "givens" and continue to be treated as discussed in Section 3.5.1 of this SSER (pp. 3-12 and 3-13).

(8) The process for validating homogeneous design activities (HDAs) is totally based on engineering judgment and there is insufficient detailed information available at this time to permit an independent evaluation of the thought process (p. 3-13).

(9) During the audit of checklists, certain problems were found concerning the coverage of design activities and the amount of detail in certain review area topics (p. 3-13).

(10) The CPRT Program Plan allows for specific detailed checklist reviews to be substituted with applicable results from the CPSES testing program. Insufficient information has been provided in the CPRT Program Plan to permit an independent evaluation of that process for allowing these substitutions (p. 3-13).

(11) There is lack of specificity describing the process that governs scope expansion based on findings from the evaluation of external source issues or the self-initiated evaluation. Also, the CPRT Program Plan does not describe how the ESIs, before being incorporated into the review of HDAs, will be assessed for root causes and generic implications and how the findings will be factored into the self-initiated evaluation. (p. 3-14)

(12) Insufficient information has been available to the staff to permit an evaluation of the process to establish the initial HDAs as well as their

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validation. Therefore, the staff cannot make a determination at this time concerning the ability of the DAP to extrapolate results (pp. 3-14).

(13) The applicant is required to prepare a matrix that correlates the number of items that a design criterion attribute has been reviewed to the associated discipline HDAs (p. 3-18).

(14) The process for identifying unique vendors has not been described in the CPRT program (p. 3-11).

C.2 DSAP VIII - CIVIL/STRUCTURAL (INCLUDING CABLE TRAY/CONDUIT SUPPORTS)

(1) In order for TERA to perform an integrated review of major concrete and steel structures in a manner consistent with its commitments referenced in the NRC Office of Inspection and Enforcement (IE) Inspection Reports 50-445/85-17 and 50-446/85-14, Appendix 2, page A-4, unique loading determinations must be performed for the referenced buildings (i.e., auxiliary building, fuel storage building, containment building, and other portions of selected buildings). DSAP VIII, Section 4.3.2.1, "Load Determination," indicates that only the auxiliary/electrical buildings will be reviewed. This is inconsistent with TERA's commitment and, in fact, precludes the performance of a thorough review.

Staff Comment

TERA should review other buildings than those listed in DSAP VIII, Section 4.3.2.1, "Load Determination."

(2) Thermal loadings or expansion considerations must be considered in the evaluation of the reactor building internal structure since this is a fundamental design consideration (e.g., to mitigate the effects of thermal expansion). Section 4.3.2.1, does not address thermal considerations.

Staff Comment

Section 4.3.2.1 should be revised to include thermal load considerations for reactor building internal structure.

(3) The NRC inspection reports (50-445/85-17 and 50-446/85-14, Appendix 7, item 4, page A-216) discuss embedment load tracking. The TERA response indicates that final design loads will be coordinated with the civil/structural discipline (e.g., to confirm that building designs are consistent with the final design loads). Section 4.3.2.1 does not discuss this.

Staff Comment

Section 4.3.2.1 should be revised to address how original building design loads are reconciled with the final design loads.

(4) Inconsistencies exist between the DAP, DSAP VIII, and Impell-Ebasco project instructions. The inconsistencies involve the statements describing the methodologies that may be used to evaluate the cable tray supports. In the DAP is stated that the established Ebasco methodologies will be used; the DSAP

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allows the use of Impell and Ebasco design procedures. Furthermore, in the DSAP is stated that only two methods of dynamic analysis will be used in analysis/design verification of cable tray supports. The Impell project instructions, however, permit the use of time-history methods, overlap methods and multilevel response spectrum methods, in addition to the two methods referred to in the DSAP.

Staff Comment

The CPRT should resolve these inconsistencies and demonstrate the appropriateness of the methodology discussed above.

C.3 DSAP IX - PIPING AND PIPE SUPPORTS

(1) It was not evident that a process existed for identifying discrepancies (or deviations) for external source issues by Stone & Webster Engineering Corporation (SWEC) in view of the fact that hardware modifications may be made to piping and supports by SWEC irrespective of the corrective actions required for safety-significant problems.

Staff Comment

A root-cause/generic implication evaluation should be performed for all hardware modifications in order to document the reasons for such modifications.

(2) The self-initiated review of the auxiliary feedwater (AFW) system does not fully address the interface with the SWEC piping reanalysis program.

Staff Comment

The third-party review should include a portion of the AFW system in its review of the SWEC piping and pipe supports requalification effort.

(3) There is a lack of information in the CPRT Program Plan regarding explanation of the process used to ensure the adequacy of the as-built data used in the SWEC piping reanalysis effort.

Staff Comment

Provide a description of the process followed by the various activities in the Construction Adequacy Program and in the SWEC program for the evaluation of as-built discrepancies including the interfaces among ERC, SWEC, and TUGCO projects and the applicable procedures used in the process.

(4) The scope of the Class 5 piping systems includes only those Class 5 piping systems within the boundaries of ASME Class 2 and 3 piping stress problems.

Staff Comment

Justify excluding the remaining Class 5 piping and supports from the SWEC scope.

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C.4 DSAP X - MECHANICAL SYSTEMS AND COMPONENTS

This action plan describes the approach and methodology established to address the design of mechanical systems and components. In the area of mechanical components, TUEC initiated a review of active valves after discovering that some vendor-supplied documentation was deficient since it deviated from FSAR commitments.

Staff Comment

In response to the NRC's August 9, 1985, letter providing comments to TUEC on the CPRT Program Plan, the CPRT issued Revision 3 of the Program Plan to address, among other matters, the issue of active valves. The CPRT has addressed this concern in the Design Adequacy Program Phase 3 scope development process. However, additional information is required. The CPRT should specify where in the DAP Phase 3 process this issue is being addressed. Since the Program Plan intends to provide complete coverage of all areas with safety significance, the CPRT should consider the issue of active valves in the Program Plan's root-cause/generic-implication evaluation. The CPRT's response to the staff concern did not specifically address the issue of active valves nor did it provide any commitment to evaluate the significance of the errors. The CPRT should specifically review whether any procedure exists to document deficiencies in specifications detected by vendors, whether there exists any documentation of or prompt followup of deficiencies such as those identified with active valves, and why the system to control the quality of design documents did not detect that the documentation had deviated from FSAR commitments.

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ABSTRACT (200 words or less)

Supplement No. 13 to the Safety Evaluation Report related to operation of the Comanche Peak Steam Electric Station, Units 1 and 2 (NUREG-0797), has been prepared by the Office of Nuclear Reactor Regulation of the U. S. Nuclear Regulatory Commission. The facility is located in Somervell County, Texas, approximately 40 miles southwest of Forth Worth, Texas. This supplement presents the staff evaluation of the Comanche Peak Response Team Program Plan which was formulated by the Applicant to resolve various construction and design issues raised by the Atomic Safety and Licensing Board, allegers, intervenor Citizens Association for Sound Energy (CASE), NRC inspections of various types, and Cygna Energy Services while conducting its independent design assessment.

The NRC staff concludes that the CPRT Program Plan provides an overall structure for addressing all existing issues and any future issues which may be identified from further evaluations, and if properly implemented will provide important evidence of the design and construction quality of CPSES, and will identify any needed corrective action. The report identifies items to be addressed by the NRC staff during the implementation phase.

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